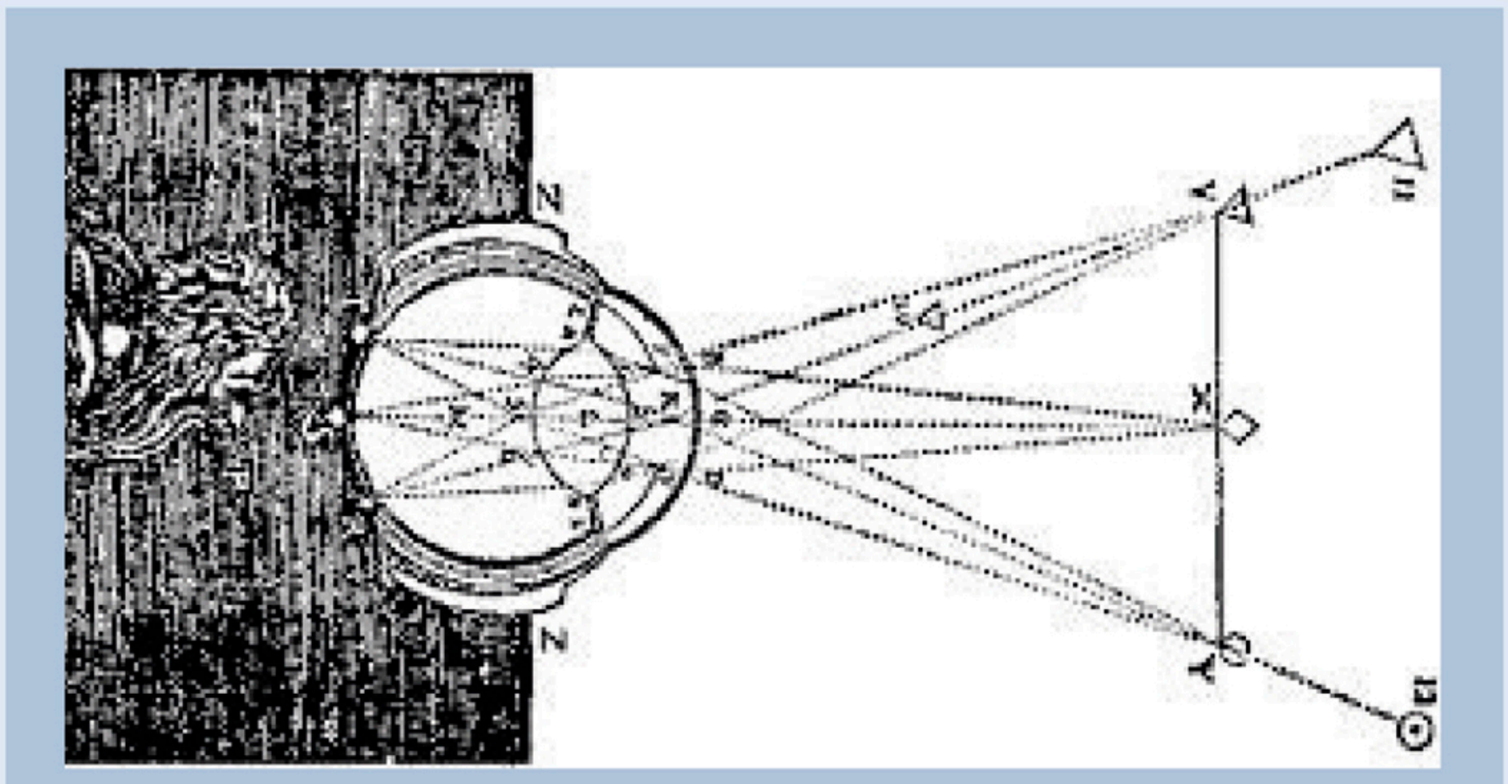
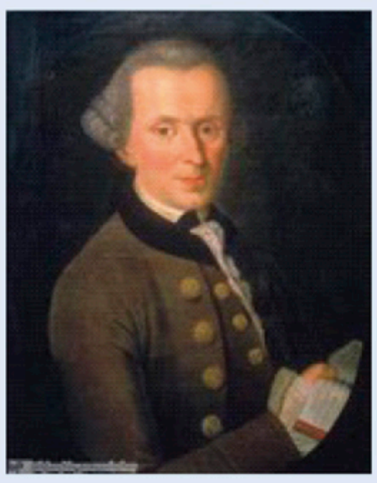
Wolfgang Wein



# Visual Turn

## Platon – Descartes – Kant – Cassirer



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Königshausen & Neumann

Wolfgang Wein

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## Platon – Descartes – Kant – Cassirer

The Turn from Empiricism, Analytic Philosophy and Naturalism to a Modern Rationalistic Neo-Kantianism

English Edition

Translated by Hella Beister

Königshausen & Neumann

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*Bibliographic information published by the Deutsche Nationalbibliothek*

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at http://dnb.d-nb.de

First published in 2022 by Verlag Königshausen & Neumann, Würzburg
© Wolfgang Wein
Cover: skh / coverart
Coverillustration: Descartes' illustration
of Kepler's Theory of the Retinal Image, Dioptric 1637
Printed in Germany

Print-ISBN 978-3-8260-7619-0
PDF-ISBN 978-3-8260-7767-8
https://doi.org/10.36202/9783826077678
www.koenigshausen-neumann.de
www.ebook.de
www.buchhandel.de
www.buchkatalog.de

# Contents

**Book One**

**I. Introduction** ..... 11

**II. Preparing the turn to a rationalistic Neo-Kantianism: Starting points and guiding considerations** ..... 47

**1. An evolutionary biology perspective on the development of visual thinking and the origin of language** ..... 47

**2. Rationalism versus Empiricism, Analytic philosophy, Naturalism (EAN), Reflections on the tone of the debate in a long-standing conflict** ..... 71
Rationalism and the world of concretely existing things ..... 83
The role of Platonism in EAN ..... 95
Rationalism and empiricism: definitions and differences ..... 112
Rationalism ..... 141
Descartes' method ..... 163
Generally criticized points of classical rationalism ..... 168
Empiricism, Analytic Philosophy, Naturalism (EAN) ..... 183
The grounding of modern empiricism: John Locke ..... 190
Abstraction process and universal concepts in empiricism ..... 218
Excursus: Plato's epistemology in the light of rationalistic Neo-Kantianism ..... 229
Hume's failed attempt to "decapitate" western rationalism ..... 237
Hume's "Theory of Ideas" ..... 251
From the unsound "Theory of Ideas" to woolly thinking ..... 262
Hume's flawed doctrine of abstraction ..... 272
Experience, experiment, and observation ..... 284

**3. "Vision Science" and the fall of empiricism's doctrine of perception** ..... 308
Gestalt theory ..... 337
Excursus: The concept of insight, the Aha! moment, "simple natures" (Descartes), and the "understanding of function" ..... 345
Are the laws of vision learned or innate? ..... 361
The emergence of visual thinking and the understanding of function ..... 376

**4. The scientific evidence for innate knowledge, and the fall of the second empiricist dogma** ..... 397
The relevance of innate knowledge in rationalism ..... 409
The origin of the doctrine of innate knowledge in Plato ..... 412
The doctrine of innate knowledge, or the "*natural light*," in Descartes ..... 420
The concept of "innate" in the philosophy of Immanuel Kant ..... 438
Carruthers: "The Case for Innate Knowledge" ..... 456
Innate knowledge: current scientific facts ..... 465

**5. Thinking without language** ..... 482
Visual thinking in the deaf ..... 486
Visual thinking in the game of chess ..... 493
Visual thinking in geometry ..... 503
Euclidean geometry, gestalt theory, vision science, figurative synthesis, Lie Transformation Groups, a priori ..... 518
Criticism of Kant's doctrine of Euclidean geometry and three-dimensional space as set forth in his Transcendental Aesthetic ..... 530
Visual reasoning in geometry ..... 544

**Book Two**

**III. Plato's "Meno" – the discovery of innate visual thinking in the course of (geometric) problem solving** ..... 559
The problem of recollection ..... 580
The role of visual thinking in solving "Plato's problem" ..... 585

**IV. The role of visual thinking in Descartes: *simple natures* and the *natural light* – the founding of modern rationalism** ..... 596
The renaissance of visual thinking in the philosophy of modernity in Descartes' "*Regulae ad directionem ingenii*" ..... 605
The senses in Descartes ..... 608
The imagination in Descartes ..... 611
*Intuitive evidence* and *simple natures* – first indications of visual thinking in Descartes ..... 619
Visual thinking in Descartes ..... 627

**V. The ambivalent position of *imagination* and *schematism* in Kant's *Critique of Pure Reason*, and the role of *visual thinking*** ..... 641
General preliminary considerations concerning the position of the *Critique of Pure Reason* between empiricism and rationalism ... 645

The imagination in Kant: its position and function ..... 658
EAN's misguided criticism of Kant's conception of the imagination ..... 662
Further observations by Kant concerning the *imagination* ..... 670
Solving the mystery of Kant's cryptic reference to "*a common but to us unknown root*" of sensibility and reason ..... 674
"*Verwandtschaftsverhältnisse*" – affinity and genealogical relationships ..... 677
Kant's A-edition version of the imagination explained as a consequence of the "empiricist perspective" ..... 680
Kant's B-edition reconfiguration of the role of imagination and synthesis ..... 688
The transformation of mental images and concepts in the schematism ..... 693

**VI. Philosophy after the *visual turn*: *rationalistic Neo-Kantianism* as the leading, science-affine philosophy of the 21st century** ..... 708
What are the indispensable guiding principles and elements of Kant's philosophy for a modern Neo-Kantianism? ..... 714
Deducing the attractive and retainable elements of Kant's architectonic from Neo-Kantianism's dissociations from other schools ..... 720
Deducing potential corrections of Kant's architectonic from the different currents of neo-Kantianism ..... 724
The *visual turn* and rationalistically modernized neo-Kantianism ..... 728
The rationalistic nature of Kant's doctrine ..... 729
Five points in Kant's doctrine which should be modernized in a rationalistic neo-Kantianism ..... 732

**Excursus: The relation between visual thinking and Ernst Cassirer's concept of function and symbolic pregnance** ..... 748

**Conclusion** ..... 769

**References** ..... 777

"*Neo-Kantians seek to demonstrate and ensure the rationality of culture.*"[1]

[1] Helmut Holzhey, Der Neukantianismus als historische Erscheinung in: Helmut Holzhey, Wolfgang Röd, Geschichte der Philosophie Bd. XII, Die Philosophie des ausgehenden 19. und des 20. Jahrhunderts 2, p. 37 – the original quote is in the past tense.

# Book One

## I. Introduction

While there is no doubt that philosophically and culturally, the past one hundred years have been under the spell of **E**mpiricism, **A**nalytic philosophy and **N**aturalism (**EAN**),[2] there are clear signals that the time has come to accomplish the turn towards a modernized *rationalistic Neo-Kantianism*, building on state-of-the-art scientific findings of the 21st century. Rapidly growing insights into molecular biology and genetics have given the basic arguments and insights of *rationalism* the very momentum that the obvious achievements of physics and the technical sciences gave to the empiricist/naturalist dogma in the 19th and 20th centuries.[3] Philosophical research that chooses to ignore the biological-anthropological insights of recent decades and the evolutionary history of

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[2] Bundling up the three prevailing philosophical currents in this rather simplistic manner, I am fully aware of the different positions and currents that existed and still exist within these philosophies, e.g. Locke vs. Hume; Carnap vs. Neurath; young Wittgenstein vs. old Wittgenstein, Quine, etc. They all have in common, however, firstly, the basic dogmas, originating from empiricism, that *all our knowledge is exclusively based on or reducible to sense experience*, that there *is no innate knowledge and no intuitive, rational insight* and that, finally, there are *no synthetic judgments a priori*. Even those currents within empiricism, analytic philosophy and naturalism that seem to differ from these basic tenets in certain points can, in the final analysis, be reduced to them. Given these congruent counter-positions to rationalism such as it was primarily set forth by Plato, Descartes and Kant (who differs in some important points but retains the essence of rationalism), I feel justified to bundle up empiricism, analytic philosophy and naturalism for the purpose of this confrontational presentation. A similar strategy was chosen by, for instance, George Bealer in: The Incoherence of Empiricism, George Bealer and P.F. Strawson, Proceedings of the Aristotelian Society, Supplementary Volumes, Vol. 66 (1992), p. 99–143. Positivism, being considered finished today, need not be specifically addressed. Other related positions such as materialism, realism and scientism are basically rather close to naturalism. If it can be shown, as I propose to do, that recent scientific findings suggest that a rationalist Neo-Kantianism is more conclusive with respect to the basic empiricist dogmas, cited above, then this also applies to all the philosophical currents that build on them. Furthermore, there will always be naïve realism in parallel too, if not underlying, these currents as an unconscious motive.

[3] See e.g.: Carey, Nessa, The Epigenetics Revolution, Icon Books London 2011.

man as well as the step-by-step development of man's cognitive faculties would today risk derision. Fortunately, the biological sciences have eminently strengthened the positions of *rationalism*, for instance in the debate about *innate knowledge* and *innate abilities* or the scientific theory of visual perception (*vision science*), while crucially undermining those of empiricism, analytic philosophy and naturalism. This science-based encouragement of basic rationalist positions has at the same time created an entirely novel constellation in the history of philosophy, offering the unique opportunity to reinvigorate the *rationalist* elements in Immanuel Kant's thinking and doctrine. The way I see it, Kant had indeed followed empiricism already too far towards the fallacious starting point of "*sense experience*." The reconsideration of the great rationalist tradition that runs from *Plato* to *Descartes* to *Kant* and, finally, *Ernst Cassirer* is meant to be the beginning of a fresh, rationalistically conceived Neo-Kantianism that would give greater internal coherence to Kant's doctrine and, what is more, be in keeping with the theory of evolution and modern science.

Significant advancements in computer technology and neuroinformatics today enable us to much better understand the entire process of seeing and the cognitive processing of visual sense experiences than this was possible only a few years ago, leading to a new and differentiated understanding – in keeping with the laws of *gestalt theory* – of the highly complex *interpretative reconstruction* that is our "*vision*." It is quite obvious that visual perception – "seeing" – is not a passive, atomistic, impressionist reproduction of reality and that this reality is not a "*given*" but a highly complex multi-stage processing and transformation of the physical stimuli of the retina, that does not exist *as such* in the *perception we interpretatively construct* and in the "visual images" we produce. This is what is today referred to as the "*impossibility of visual perception*."[4] There is no "*given*" as simply posited by empiricism, without any exact knowledge of the scientific issues involved, but something selectively *taken*, something *fabricated* in the process of a biologically and mentally-culturally informed synthesis. The discourse of "*sense perception*," which invariably presupposes that sense experiences have a certain intrinsic meaning, is therefore untenable, as proponents of Neo-Kantianism such as Hermann Cohen, Ernst Cassirer and others have shown see e.g. Sebastian Luft[5] or Kurt

[4] Brian Scholl, "Innateness and (Bayesian) Visual Perception" in: Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford University Press, Oxford/New York 2005, p. 40, and the pivotal work by David Marr, Vision: a computational investigation into the human representation and processing of visual Information, The MIT Press, Cambridge/London, 2010 (1982).

[5] Luft, Sebastian, The Neo-Kantian Reader, Routledge, Oxon/New York 2015, p. 107–136.

Walter Zeidler, Geert Edel or Christian Krijnen, for instance.[6] The supposed *direct perception* of things in themselves, which is what *realism* or *naturalism* go on to believe in even today, just doesn't happen *this* way. The two dogmas of empiricism, namely that *all* our knowledge exclusively comes from immediate *sense experience* and some subsequent "operations of the mind," and that there is no *innate knowledge* by which the physical sensations of this "*sense experience*" have always already been preselected, structured in terms of categories and transformed in terms of concept are revealed by recent scientific findings to be the very brand of unscientific "figments" that *rationalism* used to be criticized for. All the resulting misconceptions of empiricism, from the *passive* reception of *simple ideas* to the allegedly abstracting *deduction of concepts* from sense experience to the *nominalist boundedness of concepts* to the vacuity of *language games* to the assumption that there is no *innate* knowledge but only knowledge that is always *analytic* and never *synthetic a priori* are, thus, increasingly revealed as simply untenable.

This is further substantiated by a novel aspect that I will purposely call *visual thinking* and that, as a consequence, I think, of the early focus of philosophical discourse on the *logos* rather than the *eidos*, that is, on language rather than image, has been ignored in the philosophical debate and completely eclipsed by the very prevalence of analytic linguistic philosophy. Language, grown out of *visual thinking* that developed much earlier, relies on a visual *understanding of function* – which, in evolutionary terms, preceded visual thinking – to build the *concept of function* ("Funktionsbegriff" as set forth by Ernst Cassirer) and expresses it linguistically provided one is not "at a loss for words." Richard L. Gregory, one of the leading researchers in *vision science*, suggested that there might be a *grammar of vision* by analogy with Noam Chomsky's *universal grammar*, but the idea went more or less unheeded. Interestingly, Ernst Cassirer, following Kant who sometimes refers to a *transcendental grammar*, had already argued that it might be possible to "*come to something like a grammar and syntax of the human mind*."[7] This close link between visual

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[6] Hermann Cohen, Logik der reinen Erkenntnis, (Nachdruck) Berlin 1902, p. 67; Christian Krijnen, "Das konstitutionstheoretische Problem der transzendentalen Ästhetik in Kants 'Kritik der reinen Vernunft' und seine Aufnahme im südwestdeutschen Neukantianismus," in: Marion Heinz/Christian Krijnen (eds.), Kant im Neukantianismus – Fortschritt oder Rückschritt?, Würzburg 2007, p. 116 and 128f.

[7] This is pointed out by Ernst Wolfgang Orth, Operative Begriffe in Ernst Cassirers Philosophie der symbolischen Formen, in: Hans-Jürg Braun, Helmut Holzhey und Ernst Wolfgang Orth (eds.), Über Cassirers Philosophie der symbolischen Formen, Frankfurt/Main 2016, p. 68. Ernst Cassirer, Critical Idealism, in: Donald Phillip Verene (ed.), Symbol, Myth, and Culture. Essays and Lectures of Ernst Cassirer 1935–45, New Haven 1979, p. 76f.

thinking and language is most evident in a host of metaphors, almost all of which – and especially those relating to thinking – are *visual-figurative* in nature, whether you "begin to see," "the scales fall from your eyes," something "appears" to you, you "see through," "clarify" or "get an overview over" something. Incidentally, this would also provide an excellent explanation why language developed so eminently fast in Homo sapiens, that is, in the course of just a few tens of thousands of years, which still has experts baffled. At the same time, the metaphors and phrases of language advertise their own weakness in comparison to the visual sphere of thinking. Thus, "talk is cheap" and "a picture is worth a thousand words."

It was René Descartes in particular who, working on his studies in geometry, re-discovered the mode of "*intuitive knowledge*" and "*simple natures*" in his "*Regulae ad directionem ingenii*."[8] The fundamental importance of *visual thinking* for acquiring new knowledge had first been realized by *Plato* in the context of his intense concern with the solving of geometrical problems (couldn't Plato's so-called "*unwritten doctrines*" actually be his observations concerning the thought processes relied on for solving geometrical problems at his Academy?). Interestingly, John Locke, the founder of classical empiricism, also almost literally adopted this cognitive mode in Book IV of his *Essay*[9] (as did David Hume in his *Treatise*), which goes to show that this specific *visual insight* was indeed acknowledged by thinkers of various schools. I will below propose an in-depth discussion and further elaboration of *visual thinking* from a perspective of the philosophy of *rationalism*, taking Plato, Descartes and Kant as examples. This, then, will be the basis for me to set forth a modern *rationalist Neo-Kantianism* that is neither grounded in myth (Plato) nor in an innate concept of God (Descartes) nor dualistic in terms of *intuition* and *concept* with a supposed common root (Kant). Rather, it will be put on a modern, state-of-the-art basis that is consistent with recent scientific findings of evolutionary biology as well as *visual thinking* while at the same time taking further the critical-idealist neo-Kantian approach.

This consideration proceeds from the assumption that when writing his *Critique of Pure Reason*, Kant had allowed himself to be overly impressed by classic empiricism and lured away from his rationalist starting point, the *Critique*'s dedication to *Francis Bacon*[10] being only a first indication in this respect. Unfortunately, in the last decades of the 20th century,

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8 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985.

9 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, IV ii, p. 336.

10 Immanuel Kant, Critique of Pure Reason, Cambridge University Press, 1998 (in the following also referred to as CPR).

commentaries on and interpretations of the work of Immanuel Kant were largely embedded in a linguistic-analytic and empiricist world of thought, which only increased this initial imbalance. A rationalistically conceived *Neo-Kantianism* unafraid of contact and in dialogue with the sciences might succeed, not unlike Ernst Cassirer's attempts in the 1920s and 1930s, in maintaining the neo-Kantian tradition while staying open-minded towards the exponentially growing flood of new scientific findings.

Since this undertaking requires a movement of thought as broad as it is profound and covering a variety of domains before the actual philosophical issue can be addressed, I must ask the reader to be patient and let me guide him through the starting points, fields of knowledge and considerations that lead up to this novel approach. At the same time, I must ask the specialists for indulgence for it is impossible to be an expert in all the disciplines that will be discussed in this context. But how to create a strategic synopsis of these domains in a novel paradigm and at the same time engage in a wide-ranging and in-depth debate of each of the disciplines involved? Moreover, there is an exponential acceleration in the rate of publications and the volume of knowledge gained in each of these domains, which makes it almost impossible to keep abreast of the flood of publications even in a domain where one has some expertise of one's own. All one can do is seek to match the high levels of accuracy and state-of-the-art knowledge that are required for the debate at hand. And yet it is of the essence, especially for *Neo-Kantianism*, to bring the theory-of-perception basics up to date for, as Christian Krijnen notes, Neo-Kantianism is a "*theory of culture grounded in epistemology*," which does not mean that this philosophy is reduced to epistemology but that "*in Neo-Kantianism, epistemology functions as philosophia prima*."[11] As Massimo Ferrari has pointed out, Ernst Cassirer conceived of the relation between Neo-Kantianism and science as *"a 'continuous reexamination of the basic scientific concepts' … that is, 'a critique that at the same time becomes a rigorous self-examination.'"*[12]

With the growing erosion of the prevailing analytic philosophy[13,14,15] – meanwhile admitted even by its proponents ("*Traditional analytic philoso-*

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11 Christian Krijnen, Transzendentaler Idealismus und empirischer Realismus, in: Christian Krijnen, Kurt Walter Zeidler (eds.) Wissenschaftsphilosophie im Neukantianismus, Würzburg 2014, p. 11.

12 Massimo Ferrari, Ist Cassirer methodisch gesehen ein Neukantianer? in: Detlev Pätzold/Christian Krijnen (eds.), Der Neukantianismus und das Erbe des deutschen Idealismus: die philosophische Methode, Würzburg 2002, p. 107.

13 Peter Bieri, "Was bleibt von der analytischen Philosophie? (What remains of analytic philosophy?)," Deutsche Zeitschrift für Philosophie, 2007, Heft 3, p. 333ff.

14 Aaron Preston, Analytic Philosophy: The History of an Illusion, London / New York, 2010.

*phy has – foundered in silence*")[16] – and its current transformation into something of a *method-oriented business* it becomes ever more obvious that the approach that posits innate or *a priori thinking*, adopted and developed by philosophers from Plato to Descartes to Kant and Neo-Kantianism, is simply more substantially grounded and scientifically consistent than all the known variants of empiricism that were simply put on the wrong footing by John Locke's and David Hume's sensualism. After these somewhat polemical observations I feel that I owe the reader, no doubt skeptical by now, some clarifications. Why should this turn to rationalism happen precisely at this moment? The concepts are sufficiently known. What does *visual turn* mean, in the first place, and isn't it yet another "here today, gone tomorrow" turn, given that even the discourse of the linguistic turn[17] has lost much of its allure? That we are more and more living in a world where the *visual* dominates will hardly require further argument in a context where Instagram, YouTube, computer monitors, iPads and iPhones rule and even the book, the symbol of the Gutenberg era, is being digitalized for reading devices, and probably marginalized in its printed form.[18] This development has already been extensively and comprehensively commented on and addressed under headings such as "pictorial turn," "visualistic turn," "iconic turn" or "imagic turn,"[19] the interest being primarily in the advance of the visually informed world and its mechanisms and its consequences in the context of a picture-oriented society; the advance of the digital image, of the *emotionally charged singular* and *particular* packed into a single moment, as the absolute opposite of the *universal*.

My interest, in contrast, is quite different. It is in the function of *visual thinking* which has been "overlooked" as a result of the excessive narrowing-down to language but is at least as potent as the latter and which, while it does draw attention and is present in certain contexts in the history of philosophy, has not been systematically reflected upon. In the history of philosophy, there is a fascinating suppressed line that runs from Plato,

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15 See Geert Edel, Hypothesis versus Linguistic Turn, Zur Kritik der sprachanalytischen Philosophie, Berlin, 2010; and the classic work of Ernest Gellner, Words and Things, Routledge & Kegan Paul Ltd, Abingdon, 2005 (1959).

16 Ansgar Beckermann in Peter Prechtl (ed.), Grundbegriffe der analytischen Philosophie, Stuttgart, 2004, Introduction, p. 6.

17 Richard Rorty, The Linguistic Turn, London/Chicago, 1992 (1967).

18 Norbert Bolz, Am Ende der Gutenberg Galaxis, München 2008; Werner Wunderlich, Beat Schmid, Die Zukunft der Gutenberg-Galaxis, Basel 2008.

19 For an overview, see Klaus Sachs-Hombach, Bildtheorien, Frankfurt/Main 2009, p. 7ff.; see also William Thomas Mitchell, The pictorial turn; Artforum, Rowohlt, März 1992; Ferdinand Fellmann, Symbolischer Pragmatismus, Rowohlt 1991; and Klaus Sachs-Hombach, Bilder im Geiste, Amsterdam / Atlanta 1995.

who sought to know with the "*eyes of the mind*,"[20] to René Descartes, who was able to recognize "*intellectual intuition*" and "*simple natures*" in conjunction with the *innate* faculty of "*natural light*" as the anchor point of our cognition,[21] to Kant's geometrical construction in terms of *pure intuition*, set forth in his Transcendental Aesthetic, his positioning of *imagination* with its "*unknown root*," his discussion of "*blind intuitions*"[22] and his chapter on *schemata*, a relatively late addition to the "Critique of Pure Reason." As is well known, Kant's starting point for his Critique of Pure Reason is the "*disjunction*"[23] of the two "*extreme ends*" of the process of cognition, i.e., *sensibility* and *understanding*, or *intuition* and *concept*, which, however, need to come together, connect, be unified, if not transformed into each other, at some point through the workings of the *imagination* if cognition of things is to be possible at all: "*The understanding is not capable of intuiting anything. Only from their unification can cognition arise*"[24] – and, even more crucially: "*We therefore have a pure imagination, as a fundamental faculty of the human soul, that grounds all cognition* a priori." (CPR, A 124) If we take this literally, then all cognition is *based* a priori *on* the synthetic function of imagination! Kant further suggests that these two "*extreme ends*" may have "*a common but to us unknown root*"[25] and need, as in the above quotation, to be "*unified*" somewhere and somehow for cognition to arise. We propose to offer a solution to the famous Kantian puzzle of this "common root" and will discuss in detail the question of whether understanding really operates in purely *conceptual* terms. Here the *visual turn* is well set to address the question of the real sequence of thinking given that *visual thinking* is phylogenetically much older than concept, and arguably capable of synthesizing schemata and doing certain simple thought operations *without concepts*, while *conceptual thinking*, being superimposed on it, is evolutionarily younger, and slower, but in return capable of abstract thinking.

How to justify this assumption? As I see it, the focus on language (whose eminent role in the cultural and scientific development of man is,

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20 Bruno Snell, Platon: Mit den Augen des Geistes, Frankfurt/Main 1955.

21 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, e.g. chapters II, III.

22 Immanuel Kant, Critique of Pure Reason, Cambridge University Press, 1998, p. 193–194 (B 75).

23 Kurt Walter Zeidler, Grundriß der transzendentalen Logik, Cuxhaven & Dartford 1997, p. 58.

24 Immanuel Kant, Critique of Pure Reason, Cambridge University Press, 1998, p. 194 (B 76).

25 Immanuel Kant, Critique of Pure Reason, Cambridge University Press, 1998, p. 152 (B 30).

of course, beyond doubt) has completely obscured the fact that in the evolution of man, the *non-linguistic period* spanned hundreds of thousands of years – an incredibly long time compared to the perhaps five thousand years of our official history. During this time, there were two "boosts" where the human brain systematically grew in mass and developed *behind* the "seeing" eyes and the other sense organs. The first boost, about two million years ago, saw an increase in brain mass to about 500-700 cubic centimeters from Australopithecus to Homo habilis. The second boost came after a long delay at about 600.000 years ago, with brain mass increasing to ca. 1.300 cubic centimeters, which is almost its current volume. Even at the time of the second boost, early man (Homo erectus, Homo heidelbergensis) had no language as we know it.[26] Archeological findings, however, show that throughout all this time there were purposively rational practical activities such as making stone and wooden tools and simple trinkets, controlling fire or constructing habitations. Language, however, at least in the form we know, does not date back more than 100.000 years maximum (I will go into this in more detail below) while language proper appears to have developed relatively fast about *50.000 years* ago.[27, 28] Support for this comes not only from archeological and anatomical facts but, more recently, from genetic computer models that were able to mathematically backtrack to this period the emergence of the FOXP2 gene that is essential for human language.

Another important aspect of the development of cognitive skills, i.e. our "faculties," is the biological plasticity of the brain. The human brain is probably the greatest "wonder" of the universe, as Ian Robertson has rightly put it,[29] since on top of all its integrating and coordinating functions it is most notably endowed with the special capabilities of awareness, self-reflection and creative and autonomous thinking, a fact repeatedly emphasized by *Noam Chomsky*, who builds on insights of René Descartes in this respect.[30] This contrasts with EAN philosophy, and more specifically that of naturalism, whose deepest desire apparently is to transform the autonomous, creative mind into a language generating automaton, a machine if not a pocket calculator.[31] A typical example can be found in Lorne Falkenstein's book *Kant's Intuitionism – A Commentary*

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26 Steven Mithen, The prehistory of the mind, London 1996, p. 8.

27 Philipp Lieberman, The Biology and Evolution of Language, Cambridge 1984, p. 271.

28 Philip Lieberman, "The Evolution of Human Speech," Current Anthropology, Vol. 48, 1; Feb 2007, p. 59.

29 Ian Robertson, The Mind's Eye, Bantam Books 2003, p. 13. See also Hank Davis, Caveman logic, Prometheus books, New York 2009.

30 Noam Chomsky, Cartesian Linguistics, Cambridge University Press, New York 2009, p. 59–77.

31 Cf. the chapter: Mind as a Computing Machine, in: Jaegwon Kim, Philosophy of Mind, Westview Press, Boulder, Colo. 1996, p. 129–165.

*on the Transcendental Aesthetic*. Describing the difference between *rationalism* and *empiricism*, or between their methodological-epistemological currents (such as nativism), he writes:

"*To better understand the nature of the distinction between nativism/empirism and intuitionism/constructivism, consider a simple information-processing device, like a calculator. The activity of this device can be represented in terms of three distinct moments: first, information is fed into the system (the keys are struck) this causes a chain of events to take place in the machine that we can refer to as 'processing of the input'; and the result is the output of a number represented on a screen or roll of paper. The calculator can be taken as a model for the brain or the mind, considered as an information-processing device, with the senses providing the input and the output consisting of knowledge claims or 'propositional attitudes.'*"[32]

This simple example is exceedingly helpful for a deeper understanding of the EAN world of thought. "*The calculator can be taken as a model for the brain or the mind… .*" There isn't the slightest suggestion that in contrast to the punched in number "three," things, abstract relations or human reactions are not ready-for-use entities, always identical and always assigned to the same key to be typed into the passive brain, but need to be prepared by the mind, in a multi-phase interpretative process of perception, for understanding to form the respective concept by means of the categories. What we have here is a fixed world of never-changing ready-for-use individual facts, a pocket calculator that is always the same, performing simple, one-dimensional assignment processes guided by a stimulus-response logic and invariably coming up with exactly the same results. Obviously, the urge to exorcize the "ghost in the machine" (Gilbert Ryle) is so powerful that the proponents of EAN would rather transform the brain and the mind into a machine.[33] While the essence of the machine is to always do the same (which is what man constructed it for) it is the very secret of success of evolution that all its functions and processes are always laid out for flexibility and options, thus allowing for alternative paths in case a system fails or environmental conditions change. Any organism whose functioning would have to exclusively rely on the principles of a machine would go extinct after one hundred years, at the latest. In biology, and thus in man, the principle of the machine is precisely what is most inadequate. Incidentally, the fundamental mechanism of *self-deception* that manifests itself in EAN was already instructively spelled out by Ernst Cassirer in his "*Philosophy of Symbolic Forms*": the pre-attribution of *meaning*, of the *universal*, to the sense experiences themselves ("*the keys are struck*"), that is, the *tacit* pre-association of the typed

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[32] Lorne Falkenstein, Kant's Intuitionism – A Commentary on the Transcendental Aesthetic, University of Toronto Press incorporated, Toronto 2004, p. 6.

[33] For a typical example, see Paul M. Churchland, The Engine of Reason, the Seat of the Soul: A Philosophical Journey Into the Brain, MIT press 1996.

"3" with the meaning "three" that only the understanding can assign to it as different from other numbers.[34]

Falkenstein's example is helpful in yet another respect, i.e. for the discussion, in a later part of this book, of the alleged *Cartesian dualism* that is often opposed to the *materialist monism* of the present, because it provides an insight into the simple mechanistic notion of *stimulus* and *response* underlying the "*Causal Theory of Knowing*"[35] or "*Causal theory of Perception*"[36] that is time and again set forth by EAN proponents to account for the mind/body relation. You type "3," "+" and again "3" – and the output will always be: "six." If, to give an instructive example, you tap a person's shoulder with your finger, the physiological *causal chain* follows a sequence that is similar to that of the pocket calculator, i.e., indisputably, a causal chain from the stimulation of the receptors of the skin to the transmission along the afferent neural pathways to the relevant centers of the brain. But in the human *mind*, the same physiological stimulus of the finger tap follows a *second* and "*entirely different*" (Descartes) reaction chain that does not invariably produce the same output for it can be understood or construed as a greeting, a warning, as sexual harassment, a signal, a gag, a manifestation of power, of maternal affection, and much more. Nor can the mind's response – a movement of the hand, a nod, a slap in the face (let alone the subjective feelings of the thoughts that go along with it) – be predicted in the manner of a physical law. While the *form* of a causal sequence is maintained, its nature, unlike that of the pocket calculator where the values or operations assigned to each key are always the same, is no longer defined by a *simple stimulus/response* or linear input/output model. Rather, it is interpretative, complex, and not unambiguously predictable like that of a machine; it is open to many different interpretations. EAN is obsessed with making spontaneous human thinking machine-like. On the other hand, EAN is prevented by the very narrowness so aptly illustrated by the above example from understanding Descartes' view of the mind (*res cogitans*) and the external world (*res extensa*) as two "*entirely different*" entities. The situation of the finger tap on the key of the pocket calculator is not the same as that of the finger tap on the shoulder of a person, it is "*entirely different*." The Chapter *Vision Science* in this book will allow us to follow, step by step, the complete "downfall" of these simplistic epistemological EAN positions, with the

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[34] Ernst Cassirer, Philosophie der symbolischen Formen, Darmstadt 1982, Bd. III, p. 223 = Philosophy of Symbolic Forms, Yale University Press, Vol. 3.

[35] Alvin I. Goldman, "A Causal Theory of Knowing," Journal of Philosophy, Vol. 64, no. 12, (1967) p. 357f.

[36] Herbert P. Grice, "The Causal Theory of Perception," Proc. Aristotelian Society, Supp. Vol. XXXV, (1961).

typical 1960s examples à la "*S sees that there is a vase in front of him*"[37] eliciting a compassionate smile, at best.

As for the evolution of the human faculty of thought, it is an established fact that the oldest stone tools, being evidence for target-oriented, purposively rational action, are about 2.6 million years old.[38] At this point, however, an objection might be raised, namely that the cognitive performance and the difference compared to the tool use of trained primates are relatively small and that consciously purposeful-rational thinking and reasoning cannot be assumed with certainty. So, to make for a stronger argument, let's start with *Homo erectus,* or *Homo heidelbergensis*, who is associated with a period of about one million to 300.000 years Before Present (BP). This period is characterized as paradoxical and peculiar, for while there are the first wooden hunting spears along with improved stone tools, as well as reliable evidence of the control of fire, there is only little evidence of a developed culture.[39] This phase of limited cultural and civilizational achievements persists up to the time of the Neandertals (between about 300.000 and about 30.000 BP):[40] there are technical skills, the ability to survive under the most adverse climatic conditions, the hunting of powerful animals such as rhinoceroses and mammoths, but hardly any forms of culture such as those found later with Homo sapiens (burial rites, decorated everyday objects, evidence of religious acts).[41] We are thus dealing with hunter-gatherer societies that were clearly capable of purposively-rational technical achievements but apparently had no language in today's sense of the term, probably communicating only with sign language or some kind of proto-language that sufficed for the purposes of hunting and simple tasks but not for the formation of abstract cultic or religious notions and acts. If people are able to make stone tools and wooden spears, form groups to hunt down animals, and control the use of fire, it follows that there must have been some kind of *thinking without language*. Therefore, thinking must have been possible *visually*, that is, exclusively relying on pictorial processes. Moreover, sign language, although termed a language, actually relies on exclusively visual means, a fact most of the literature tends to overlook. It is expressed visually and has to be understood at an exclusively *visual* level – *understanding without a spoken language*.

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37 Alvin I. Goldman, "A Causal Theory of Knowing," Journal of Philosophy, Vol. 64, no. 12, (1967) p. 358.

38 Douglas Palmer, The Origins of Man, London 2007, p. 129.

39 Steven Mithen, loc. cit., p. 11.

40 Douglas Palmer, The Origins of Man, London 2007.

41 Steven Mithen, loc. cit., p. 166ff.

Language as we know it developed, over a period lasting from about 100.000 to 50.000 years BP, from spoken and sign languages,[42] enabling the expression of *thoughts, intentions, emotions* and *logical processes* which, however, must *have pre-existed* to be expressed at all. Noam Chomsky, one of the greatest thinkers and researchers of our time and the founder of contemporary linguistics, conceives of language as a relatively recent and sudden occurrence in the history of human evolution:

"*There is no real evidence for use of language prior to maybe 50.000 years ago or so. But the neuroanatomy seems to have been in place before that, so maybe 150.000 years ago. Anyway, it's recent. The emergence seems to be fairly sudden, in evolutionary terms, in an organism with a very large brain, which was developed for whatever reason…*"[43]

This is a highly interesting observation since it actually highlights the specific, and peculiar, fact that supports my thesis. *Visual thinking* obviously developed during the many hundreds of thousands of years of the "speechless" period of the evolution of man and of the brain, enabling stone-age living and activities (hunting, simple habitations, fire, living in groups) – and we should bear in mind that more than half of our brain is dedicated to the control and processing of *vision*. Unsurprisingly, therefore, early humans had already developed a relatively large brain when they started to put visually thought thoughts into sound. Basically, primitive instrumental, purposeful-rational logic that sufficed for simple practical activities and interactions *must* therefore have developed *visually* and non-linguistically, linking up with the emergent *self-awareness* over time. One of the reasons why the current turn towards the visual with its omnipresent visual media is so overpowering could well be that it is also a *return* to our primal thinking habits, to the origin of our universal, innate, visually grounded thinking. In his standard work "Eye and Brain," the famous English researcher Richard Gregory who had a significant and decades-long impact on the scientific debate of visual cognition research and one of whose primary concerns was with the classification of optical illusions, offers the following consideration:

"*Perhaps human language developed from pre-human perceptual classifications of objects and actions. This notion might explain why the natural languages have similar basic structures. This is stressed by experts such as Noam Chomsky and Steven Pinker, though such innateness is perhaps controversial… For it is striking that the obvious*

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42 Morten Christiansen/Simon Kirby, "Language Evolution: the hardest problem in science?" In: Morten Christiansen/Simon Kirby (eds.), Language Evolution, Oxford University Press, Oxford/New York 2009, p. 8.

43 Noam Chomsky, On Nature and Language, Cambridge University Press, Cambridge 2002, p. 149f.

*names for kinds of illusions are the same as for errors of language: ambiguities, distortions, paradoxes, fictions."*[44]

Given the chronological sequence of human evolution it seems highly plausible that cognitive structures, human thinking, a primitive, non-abstract "physical" *understanding of function* (as I propose to call it) developed on the basis of the existing visual perception. I conceive of *understanding of function* as an understanding of simple relationships, such as, for instance, a lever effect or simple mechanical devices, in the absence of linguistic-conceptual thinking. Paradoxically speaking, this would be something like a *concept of function* without concept, that is, understanding by exclusively visual-cognitive means. Still, this early form of *visual thinking* should not be disregarded per se since it kept evolving successfully over hundreds of thousands of years and, by its sheer functionality, provided early man with a level of technical problem-solving skills that was sufficient for him to survive ice ages, for instance, *without the faculty of language*. Recently, interesting attempts have been made to harness this superiority of *visual thinking* for *problem solving* by means of computer games:

"*Humans are better than computers at performing certain tasks because of their intuition und superior visual processing. Video games are now being used to channel these abilities to solve problems in quantum physics.*"[45]

What is particularly interesting here is that this solving of open issues of quantum physics is not attempted by means of *language games* but by resorting to intuitive and *visual* capacities that are superior even to computer programs. *Visual thinking* had indeed to be fast, not least because in situations where identification of friend or foe is required, swiftness and efficiency is of the essence. Then, in fractions of a second, you simply "see" that one shape is dangerous and the other is familiar. Conceptual thinking, more recent in evolutionary terms, is too slow for this, even though it is, of course, also more versatile and enables abstract thinking. As *Noam Chomsky* (with whom I agree in all philosophical issues, in contrast to all his political views) has shown,[46] all known languages follow an innate *universal grammar*, and it is arguably along these lines, following the same evolutionary logic of cognitive development, that we should

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44 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 247f.

45 Sabrina Maniscalco, "Quantum problems solved through games," Nature, Vol. 532, 14 April 2016, p. 184.

46 Noam Chomsky, Language and Mind. Harcourt Brace & World, New York 1968; Reflections on Language. New York: Pantheon Books 1975; Noam Chomsky, Rules and Representations, New York: Columbia University Press 1980.

conceive of a "*visual grammar*," or a basic structure of a visual logic.[47] Language expresses the thoughts that have been formed, for example, as representations in visual thinking, and therefore one may occasionally struggle for words to formulate these thoughts, or representations, in conceptual terms. Thus, *two* forms of thinking seem to coexist: *visual* thinking, old but very fast, and *language-based* thinking, more recent, much more sophisticated, but slower.

That innate visual thinking is older and more archaic does not make a difference when it comes to logical target achievement as long as it accomplishes its tasks reliably and logically. Indeed, when analyzed step by step, our reasoning for problem solving actually starts out from elementary visual, intuitive evidences and proceeds from the simplest to the most complex relations, thus gaining in complexity and abstraction in a systematic upward movement, as shown by Plato in his Dialogues, by Descartes in his *Regulae ad directionem ingenii*, and by Kant in his *Critique of Pure Reason* in terms of the *figurative synthesis of the imagination* and, more specifically, *schematism*. I propose to show that as early as in *schematism*, a form of visual elaboration and presentation of the *universal*, of the ideal-type characteristics of a concrete representation of, say, a particular object or animal is accomplished without the conceptual level being involved at all. If this approach is consistently followed up it will become clear that the basic principle, the *essence of concept*, is *rooted* in or, rather, has evolved from the visual process of ideal-type representation and that the linguistic-conceptual system is a continuation of this faculty of *figurative abstraction* by other means. Whoever is able to draw an ideal-type stag, resulting from many different observations, on the walls of a cave without having a language to rely on is *of necessity* capable of capturing the *universal* for he has been able to strip the animal of all that is accidental and to do so in a way that others can recognize it as a stag. The same could be said of the stag on the road sign "wild animals crossing": it has no resemblance whatsoever to the photographical image of a stag and still expresses the *universal*, or the *general* traits, of the animal in a way everybody understands and recognizes. At the same time, this of course implies that *language* – and, with it, *linguistic philosophy* – no longer has the exclusive monopoly on the representation of thought.

Paul *Natorp*, in his work on the logical foundations of the exact sciences, addressed this question of the "*original unity*" of thought in the context of Kant's concept of "*synthesis*." In a first step, Natorp explains that analysis alone can never lead to new knowledge because it follows the principle of opposition and, therefore, acts like a magnifying glass, that is,

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[47] Recently, more and more attempts have been made to explore this visual grammar; see, among others: Christian Leborg, Visual Grammar, Princeton Architectural Press, New York 2006.

makes existing relations more visible but does not create new ones. His assessment of this situation is as follows:

"*The original is therefore neither affirmation nor negation, neither identity nor difference (let alone opposition), neither synthesis nor analysis but cohesion; not by post hoc harmonization and agreement but by* root-like, original unity. *This indeed was the basis of Kant's synthesis; synthesis was meant to be the origin of cognition; but the least one can say is that 'synthesis' is not the most adequate term for this, if only because it suggests the opposition to analysis, which as a consequence could not be the ultimate one but would itself* refer to a still more primal unity from which it would originate, *in the first place.*"[48] (my emphasis, WW)

Natorp's grasp of this logical "mystery" is truly admirable, and he quite rightly notes that the logical unity of consciousness, the foundation of all thought, must be grounded in more than opposition, analytic, and the like. He also very clearly sees that the solution of the philosophical "primary question" lies in the direction of *synthesis* in a Kantian sense, but also that synthesis itself still cannot be this original unity. My argument, then, is that *visual thinking* is precisely this *root-like original unity* because it *can* fulfill this very function and perform this very act of *synthesis* in a *non-conceptual mode* and "before" conceptual thinking sets in at all, although the latter is genuinely modeled on the former!

Traditional syllogistic logic, developed and set forth in its formal systematic with incredible precision and comprehensiveness by Aristotle and, by the general opinion of philosophers, unsurpassed until its "mathematicisation" by Gottlob Frege in the 19th century, builds on the *syntax of language*. In Book IV of his *Metaphysics*, Aristotle indeed argues that "that which is is indeed spoken of in many ways,"[49] while his *Organon* is basically an elaborated logical theory of language where this "speaking of what is" is, step by step, formalized. In his *Prior* and *Posterior Analytics*, then, logic is finally presented in a linguistic form. Thus, it was for Aristotle to accomplish the turn to the linguistic-conceptual logic that until Descartes virtually dominated the thinking of medieval scholasticism and early modernity. Going one step farther back in time, to his teacher Plato, one finds an intriguing indecision between conceptual and *visual* thinking – just think of the role of the visual and of light in the Allegory of the Cave, the Analogy of the Divided Line, the Analogy of the Sun, the *vision of ideas*, or of the fact that a good knowledge of geometry was a precondition for being admitted to his Academy since geometry was considered to be the *clearest* and *most evident* example of applied visual-logical thinking.

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48 Paul Natorp, Die logischen Grundlagen der exakten Wissenschaften, Leipzig/Berlin 1910 (reprint), p. 21.

49 Aristotle, The Metaphysics, Penguin Classics 1998, p. 79–80.

This is highlighted by Rudolf *Arnheim* in his very interesting book "*Visual Thinking*," in the chapter "Plato of two minds":

"*In Plato's dialogues, an ambiguous attitude expresses itself in two quite different approaches, which coexist uneasily.*"

There is, one the one hand, Plato's well-known doctrine of forms that is supposed to become accessible through dialectical-conceptual argument and, on the other, in the most relevant Dialogues, a strong reference to visual rationality:

"*He speaks of gazing upon truth that is the very being with which true knowledge is concerned: the colorless, formless, intangible essence, visible only to the mind, the pilot of the soul.*"[50]

Arnheim specifically refers to the Dialogues *Phaidon* and *Meno* where *visual* thinking is particularly prominent. I will below take Plato's *Meno* as a starting point since it is an *eye-opener*, or so I think, for the way visual thinking is linked to the process of cognition and has been received with great interest not only by Descartes[51] but also by Kant and many modern philosophers right up to Noam Chomsky.[52] This decidedly visual approach, however, was long eclipsed – as noted above – by Aristotle's powerful language-based syllogistic logic and not reconsidered, in its essence, until Descartes' philosophy and re-engagement with Plato. In his *Regulae*, Descartes introduces *intuitive evidence* as a mode of cognition, using geometric shapes as a prime example. Here again, logical cognition is linked to visual thinking, and examples from geometry are used to put it into practice. Kant, too, refers to *geometry* when reflecting on purely *a priori intuitions* in his Transcendental Aesthetic. There, he argues:

"*Since the propositions of geometry are cognized synthetically a priori and with apodictic certainty, I ask: Whence do you take such propositions, and on what does our understanding rely in attaining to such absolutely necessary and universally valid truths? There is no other way than through concepts or through intuitions, both of which, however, are given, as such, either a priori or a posteriori.*" He then illustrates this with an example taken from geometry: "*Take the proposition that with two straight lines no space at all can be enclosed, thus no figure is possible, and try to derive it from these concepts. All of your effort is in vain, and you see yourself forced to take refuge in intuition, as indeed geometry always does.*"[53]

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50 Rudolf Arnheim, Visual Thinking, Berkeley 1997, p. 6ff.

51 René Descartes, Letter to Voetius, May 1643, in René Descartes, The Philosophical Writings of Descartes, Vol. III, John Cottingham, Cambridge University Press 1991, p. 222f.

52 Noam Chomsky, Cartesian Linguistics, New York / London: Harper & Row 1966, p. 63.

53 Immanuel Kant, Critique of Pure Reason, Cambridge University Press, 1998, p. 187–188 (B 65/66).

So it is clear that the intuitively accessible elements of visual thinking were at all times kept in *sight*, along with conceptual thinking, by the great philosophers and were considered in parallel with discursive thinking in their reasoning, but that this approach was increasingly eclipsed by the progressive mathematization of geometry and the focus on concept and the logic of language. I believe that some of the irresolvable philosophical controversies may have their origin in that our *visual* and our *discursive* logics tend to get mixed up, the former primary and familiar, the latter abstract and "new" in evolutionary terms, and that the philosophical treatment of the spheres of the visual such as, for instance, *representation*, *intuition*, *imagination*, *gestalt*, *figurative synthesis* or *schema* is, in part, not up to date.

At first glance, all this may seem surprising and speculative, but the more you think about it the clearer it becomes that language itself cannot deny its descent from "*visual grammar*." As Stephen Kosslyn notes: "*Vision permeates even our language, which is replete with visual metaphors*."[54] So *scales fall from our eyes*, a *flash of inspiration clarifies* a context, we *see daylight* (in Kant), speak of en*lighten*ment, *synopsis*, getting things into *perspective*, *seeing* the big *picture*, obtaining an *overview*, feeling that something becomes *crystal-clear* or, on the contrary, are groping in the *dark*, fail to *see* the wood for the trees, present "*A Crystal Clear Report to the General Public Concerning the Actual Essence of the Newest Philosophy*" (Fichte), wear *blinkers* or have an *epiphany* when something *dawns* on us. There is *insight*, *regard (as in "with regard to")*, *overview*, *point of view*, *view*, *perspective*. Vision-based terms are often used as synonyms for thought processes: we say "*I see*…," for instance a difference or the meaning of something we are told, when we actually think it. Interestingly, none of the metaphors for thought processes refers to other sensory perceptions: there is no touch- or hearing-based equivalent to *seeing through* something, or have it *clarified*. When we want to give examples for really irrefutable facts, when we want to stress that something is beyond doubt, we rely on intuitive (in the Kantian sense) images such as "wooden iron," the "camel that does not go through the eye of a needle," the "common thread that runs through something," the "squaring of the circle." Such metaphors are intuitively and immediately understood, they leave no room for opposition, what we think is evident as a representation, and a fact. Whereas, when we remain in the abstract, opinions easily diverge.

But this "*seeing daylight*," "*flash of inspiration*," "*scales falling from one's eyes*" does not only highlight the visual nature of the "epiphany," it alerts to another elementary question, namely *how* such an *insight* comes about. Actually, this is the basic question of all thinking, for the discovery

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[54] Stephen, M. Kosslyn, "Visual Cognition, Introduction," in: Stephen Kosslyn, Daniel Osherson (eds.), Visual Cognition, Vol. 2, Bradford Book MIT 1995, p. xi.

of something new cannot be explained by drill ("Abrichtung," Wittgenstein) and inculcation or "training on the part of society" (Quine), and yet doing scientific work, doing research, engaging in creative and innovative activities is possible only for those who gain new *insight*. And the fact that a *question* is formulated at all reveals that a first *insight* has already been gained, namely that there has been a contradiction, or cognitive dissonance, between a new definition and all those hitherto known, which may lead to the formulation of a *hypothesis*. The proponents of *gestalt theory*, it should be noted, were the first to scientifically explore, in the context of their psychological research in the 20th century, the important question of *how* new knowledge is gained. But it is no less true that 2.300 years earlier, this question that is fundamental to all thinking was already raised by Plato in his *Meno* Dialogue. So, since the gaining of new, general and necessary *knowledge* about objects or relations (or, to put it differently, the obtaining of *synthetic judgments a priori*) and the definition of this process have always been of fundamental importance (and have, by the same token, always been challenged and denigrated as meaningless by EAN) I propose to further clarify the issue by a re-reading of the *Meno* Dialogue, with *visual thinking* in mind, for there are many new insights also in this respect.

This also applies to the sphere of numbers and of mathematics and geometry. Stanislas Dehaene, having devoted many years to the study of the relation of thinking and mathematics from a perspective of evolutionary psychology, comes to the following conclusion:

*"Among the available theories on the nature of mathematics, intuitionism seems to me to provide the best account of the relations between arithmetic and the human brain. The discoveries of the last few years in the psychology of arithmetic have brought new arguments to support the intuitionist view that neither Kant nor Poincaré could have known. These empirical results tend to confirm Poincaré's postulate that number belongs to the 'natural objects of thought' the innate categories according to which we apprehend the world… Intuition about numbers is thus anchored deep in the brain. Number appears as one of the fundamental dimensions according to which our nervous system parses the external world. Just as we cannot avoid to seeing objects in color (…) and at definite locations in space, in the same way numerical quantities are imposed on us effortlessly through specialized circuits of our inferior parietal lobe. The structure of our brain defines the categories according to which we apprehend the world through mathematics."*[55]

Recent scientific findings do not only support the view held by Descartes, Poincaré and Immanuel Kant, i.e. that we rely on the order of innate (or, in Kant's terms, *a priori*) rational structures to shape and understand the phenomenal world. These structures of thinking, which from today's

[55] Stanislas Dehaene, The Number Sense, Oxford University Press, New York 2011 (1997), p. 226f.

perspective are deeply anchored by evolution, are also a tool kit for thinking that must have *preceded* any development of language. So it might not be that surprising if even mathematical thinking which, in the final analysis, is based on natural numbers (integers) would eventually be reducible to *visual thinking*. For prior to understanding the synthetic judgment 7 + 5 = 12, we need to have *visualized* it in the intuition, using our fingers (as already described by Kant) (hence also the term of *digits*). Moreover, the *spatial ordering of the numbers* on an imagined *number line* suggests that spatial, visual thinking was the basis for the natural numbers to get anchored in the brain (I will come back to this in detail in the chapter on innate knowledge).

At the very beginning of his Metaphysics, Aristotle already argues the *precedence of vision* over all other forms of perception with respect to gaining knowledge. But in *De Anima* he also refers to the close relation between thinking and pictorial processes in the soul:

"*To the thinking soul images serve as if they were contents of perception (...) That is why the soul never thinks without an image. (...) The faculty of thinking then thinks the forms in the images, and as in the former case what is to be pursued or avoided is marked out for it ...*"[56]

If we follow up this insight by Aristotle, we obtain direct guidance on how to think the "forms in the images" of a *general representation*, with the "*faculty of thinking*" producing the *intelligible forms* by separating what is essential from what is to be "*avoided*." So much, at this point, for Aristotle and the possibility of *general representations*, in contrast to the EAN approach which maintains that all you can ever imagine is individual cases of objects from *sense experience*, and in anticipation of my more in-depth discussion of the issue in a later part of this book.

Descartes often refers to "*natural light*" as the innate structure of reason, and his criteria of evidence are *clarity* and *distinctness*. The further development of *visual thinking* in the history of philosophy shows that almost all the irrefutable truths that are invoked by Descartes or Leibniz as examples of innate notions are visual in origin, as are our geometrical axioms and even the more general logical ones, e.g. that the *part is smaller than the whole*, that something *cannot be and not be at the same time*, that innate abilities are like contact veins in a block of marble that the artist uncovers to carve out the statue.[57] And even Ludwig Wittgenstein, the "shining light" of the "language game," urges caution in the fragmentary

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[56] Aristotle, On the Soul, trans. by J.A. Smith, MIT Internet Classics Archive, III/7.

[57] Gottfried W. Leibniz, New Essays on Human Understanding. Preface and Book I: Innate Notions, accessed: http://www.earlymoderntexts.com/assets/pdfs/leibniz1705book1.pdf, 2010–2015, p. 24.

patchwork of his "Philosophical Investigations": "don't say (…) but *look and see*."[58] In his late and last writings he seems to probe deeper and deeper into the question of what "see[ing] (…) as such-and-such" really means[59] and why it is that in some contexts in mathematics we can *see* relationships better than we can think them.[60] He seems to have very clearly felt that there is a troubling and unclear domain that cannot be optimally expressed by language or, reversely, that lends itself more readily to representation by mere "seeing" than by language.

A similar problem arises with regard to the mode of "*showing*," promoted by him in terms of linguistic philosophy. When we choose an *ostensive* procedure and point at something because language is no longer sufficient to make a message understood, what exactly are we doing? We tacitly invoke a *visual understanding* (namely the underlying *visual thinking* that is always already there) without realizing what we are doing. Because otherwise, even pointing would not lead to understanding. For when you point to something *without* the use of language and in so doing assume that your counterpart will *understand* exactly what you mean, then you take it for granted, by this very act, and are confident that even without language there still is another mode of understanding to resort to, a *non-linguistic* form of understanding! In EAN philosophies and their naïve discourse of the "ostensive," this is completely ignored; it is tacitly presupposed but its implications are not gone into. Pointing as a means of signifying implies that we have to resort to *visual thinking* because language is insufficient.[61]

Now is the time, I feel, to clearly distinguish *visual thinking* and the intended *rationalistic Neo-Kantianism* from philosophical currents and schools of thought that, while of more or less similar description, should on no account be confounded or associated with it. I am thinking of the following:

1. *Empiricism*, *Analytic philosophy*, *Naturalism*, which in spite of all their differences, currents and variations are, in the final analysis, based on the two tenets of empiricism as defined by Locke and Hume: firstly, the non-scientific belief that all our knowledge comes exclusively and *directly* from *sense experience* and, secondly, that there is *no innate knowledge*. With this focus on *sense experiences*, impressions, "sensation" or "observa-

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58 Ludwig Wittgenstein, Philosophical Investigations, London 1958, § 66, accessed: https://docs.google.com/file/d/0Bw-duXxYihdvWVlFaUhzclY5Vmc/view.

59 Ludwig Wittgenstein, Remarks on the Philosophy of Psychology, Oxford 1980, Vol. I, p. 4e–18e and Vol. II, p. 26e–27e.

60 Ludwig Wittgenstein, Remarks on the Foundations of Mathematics, Oxford 1978, IV, § 17, p. 233.

61 Ludwig Wittgenstein, Philosophical Investigations, London 1958, §§ 33, 669, accessed: https://docs.google.com/file/d/0Bw-duXxYihdvWVlFaUhzclY5Vmc/view

tion" the *visual turn* has nothing to do whatsoever, notwithstanding its intense concern with visual thinking. Why the in-depth discussion in the field of perception and in the field of innate knowledge is nevertheless so important largely follows from the self-concept of empiricism. In his peculiar essay "*Human Knowledge and Human Nature*" that quite openly professes to be written in defense of empiricism, (which is one of the reasons why it provides such a useful point of departure for the discussion below), Peter Carruthers defines the basic attitude of empiricists as follows:

"*Empiricists have defended two distinctive negative theses about our sources of human knowledge, which may or may not be intimately connected with one another (…). First, they have been opposed to any form of nativism, for example denying that any concept or any knowledge is innate (inborn). Secondly, they have denied that we may obtain substantive knowledge of the world a priori, insisting rather that all such knowledge must be grounded in experience.*"[62]

This quite clearly summarizes, if negatively, the two basic tenets: Firstly, there is *no* notion or *knowledge of whatever kind* that is *innate*, and secondly, we are supposed to *not* have any knowledge that does not exclusively come from *external* sources, that is, from *sense experience*. Refuting these two basic tenets of empiricism will, therefore, be an important and enlightening step towards the liberation of thinking from false beliefs, and we will take great care to examine whether all knowledge can really be based on and is reducible to *sense experience* alone and whether there isn't *innate* knowledge, after all. As regards the first "negative thesis," Carruthers comes rather close to our own reasoning (which is also why I have described his book as "peculiar") because in this defense of empiricism he himself, on the one hand, offers a step-by-step demonstration that *innate knowledge* indeed exists, and even to a very large extent, while, on the other, he seeks to show that in spite of its damageable defeat in this respect, empiricism can just happily go on living. The second basic tenet, i.e. "*sense experience*," also seems to be something he'd rather get rid of in passing, a step where other EAN proponents would certainly not follow suit. What is at stake is the doctrine of the *immediate, direct* mode of perception that, in the final analysis, would seem to be something like a *copy* of reality and from which all our knowledge is supposed to be deducible. Alfred Ayer, for instance, argues:

"*Thus, to ask what is the nature of a material object is to ask for a definition of 'material object', and this… is to ask how propositions about material objects are to be translated into propositions about sense-contents.*"[63]

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62 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 3f.

63 Alfred J. Ayer, Language, Truth & Logic, Dover Publications 1946, p. 59.

Similarly, for *naturalism*, W.V.O. Quine states:

"*Two cardinal tenets of empiricism remain unassailable, however, and so remain to this day. One is that whatever evidence there is for science is sensory evidence. The other… is that all inculcation of meanings of words must rest ultimately on sensory evidence. … But why all this creative reconstruction, all this make-believe? The stimulation of his sensory receptors is all the evidence anybody has had to go on, ultimately, in arriving at his picture of the world*."[64]

Considerations like these also provide the epistemological foundation for *analytic philosophy*. Thus, clear suggestions that his view is in keeping with naturalism as well as empiricism in this respect can already be found in the writings of one of the originators of analytic philosophy, *Bertrand Russell*. He assumes a parallelism that is made up of "*things*" or "*pieces of matter,*" on the one hand, and "*perspectives*," on the other. But perspective, here, is not the perspective from which something imagined is being thought; rather, it is the *series of aspects* that, not unlike the sequences of a movie, allow us to *optically* apprehend a thing. He is never concerned with, say, the *function* of a thing but always exclusively with sense experiences that are received in a *passive* way following a causal pattern of stimulus and response:

"*This dualism has nothing to do with any 'mind' that I may be supposed to possess; it exists* in exactly the same sense if I am replaced by a photographic plate*. We may call the two places the active and passive places respectively. Thus in the case of a perception or photograph of a star, the active place is the place where the star is, while the* passive place *is the place where the* percipient *or photographic plate is. ... Thus what may be called subjectivity in the point of view is not a distinctive peculiarity of mind:* it is present just as much in the photographic plate*. And the photographic plate has its biography as well as its 'matter'*."[65] (my emphases, WW)

What is obvious here is the doctrine, dating back to Locke and Hume, that posits the *passive* form of perception, as well as Locke's "white paper" (*tabula rasa*, "blank slate") in a modernized version, i.e. the photographic plate as a means of mere reproduction, and the latent materialism, barely veiled even in Locke. But Russell gets even more specific:

"*If we admit—as I think we should—that the patch of colour may be both physical and psychical, the reason for distinguishing the sense-datum from the sensation disappears, and we may say that the patch of colour and our sensation in seeing it are identical.*
*This is the view of William James, Professor Dewey, and the American realists. Perceptions, says Professor Dewey, are not per se cases of knowledge, but simply natural*

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64 W.V. Quine, Epistemology Naturalized, in: Ontological Relativity & Other Essays, New York: Columbia University Press 1969, p. 75.

65 Bertrand Russell, The Analysis of Mind, London: G. Allen & Unwin: New York: Macmillan 1922, p. 130–131.

*events with no more knowledge status than (say) a shower. … I think he is right in this, …*"[66]

Since Russell, when speaking of "seeing" the patch of color, does not refer to the two-dimensional, laterally reversed and upside-down image on the retina (which might yet pass as a natural phenomenon in the broadest sense even though modifying physiological mechanisms are involved even at this stage) but believes that one has really perceived a patch of color (like a photographical plate would), he is not speaking metaphorically in this context; rather, we are presented with his genuine theory of perception. And so the circle between empiricism, analytic philosophy and naturalism is completed with regard to the unquestioned naturalistic theory of immediate (sensory) perception. And while there may well have been a wide range of variations and attempts at whitewash and repair, all these, too, are still in a more or less deliberate and more or less dressed up way grounded in the same insufficient basic tenets of empiricism, i.e. *sense experience*.

In contrast, my own understanding of *visual thinking* is completely contrary to the *sensualistic immediacy* of empiricist impressionism and sensualism! The meaning of "principle," "generalization" or "federal law" can never be reduced to a *stimulation of sensory receptors*, nor can the *sensation* of a finger tap on a shoulder be monocausally linked to the interpretation given to it by the person whose shoulder is tapped. Actually, "seeing" always is *interpretation*, *formation*, *construction*, *synthesis*, organized in terms of space and time and guided by our elementary innate *gestalt laws* and, by extension, the *categories* of our understanding. As soon as in the course of evolution *visual thinking*, having to cope with the demands of complex relations and abstraction in social interactions, became language-based it transitioned into the innate structures of *universal grammar*, as Noam Chomsky has so impressively explained, and into the a priori categories of thinking that Kant logically deduced from the forms of judgment. This distinction also holds for my novel approach, designed to take account of a *visual thinking* that operates as a complement to conceptual thinking, for the ability to solve visual tasks is not a matter of *stimulations of sensory receptors* nor of *sensualistic immediacy* but of *visual thinking* – thinking without language. So, once more for emphasis: the visual intuitive thinking of *rationalism* is diametrically opposed to the sensualistic emphasis on seeing, showing, the *ostensive*, for it is *thinking*, not gazing or seeing. I would furthermore like to dissociate myself from recent studies that focus on the role of the imagination and of fantasy, important and meritorious though they may be. My concern is quite defi-

[66] Bertrand Russell, The Analysis of Mind, London: G. Allen & Unwin: New York: Macmillan 1922, p. 143.

nitely not with fantasy and the pictorial worlds of the imagination but with structured visual thinking (!) as it manifests itself in, for example, geometry, architecture, or the game of chess.

*Analytic philosophy,* as mentioned above, is "*fading away*" today even by its own account and seems to seek perpetuation as a kind of methods-based "movement" preoccupied with the question of "*what remains of it*," or to see its mission in producing historical reviews and a "cult of the saints" (i.e. G.E. Moore and Russell or Wittgenstein). The formalistic orientation to "language-police" rules and methods may have enhanced the surface quality of publications but has done little, in my opinion, to creatively advance philosophy. Rather, it has resulted in the paralysis already described and anticipated at an early stage by Ernest Gellner.[67] Had it not been for the stand taken by a thinker as brilliant, unswerving, courageous and ingenious as Noam Chomsky against this dogma, we might today still be completely in the grip of the tenets of *behaviorism*, *empiricism*, *positivism* and the "sledgehammer arguments," however vacuous, of a Gilbert Ryle. It took Chomsky's demonstration that *universal grammar* is *innate*, being a general structure of the mind, to force a massive first breach in the linguistic-philosophy world of the EAN empire.

2. So-called *evolutionary epistemology* was first proposed in the German language area by Konrad Lorenz in his paper on the a priori of the "cognitive apparatus," published during the Nazi period. There, Lorenz posed the fundamental questions that spontaneously come to mind for any person attuned to the ways of scientific thinking:

"*Is not human reason with all categories and forms of intuition something that has organically evolved in a continuous cause-effect relationship with the laws of the immediate nature, just as has the human brain? Would not the laws of reason necessary for a priori thought be entirely different if they had undergone an entirely different historical mode of origin, and if consequently we had been equipped with an entirely different kind of central nervous system? Is it at all probable that the laws of our cognitive apparatus should be disconnected with those of the real external world? Can an organ that has evolved in the process of a continuous coping with the laws of nature have remained so uninfluenced that the theory of appearances can be pursued independently of the existence of the thing-in-itself, as if the two were totally independent of each other?*"[68]

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[67] Ernest Gellner, Words and Things, Routledge & Kegan Paul Ltd, Abingdon 2005 (1959).

[68] Konrad Lorenz, Kant's Doctrine Of The A Priori In The Light Of Contemporary Biology, Internet Archive, opensource collection, p. 231; accessed: https://ia800708.us.archive.org/19/items/KantsDoctrineOfTheAPrioriInTheLightOfContemporaryBiologyKonradLorenz/Kant's%20doctrine%20of%20the%20A%20priori%20in%20the%20light%20of%20contemporary%20biology_Konrad%20lorenz.pdf

In this paper, Konrad Lorenz argues that the student of nature needs to dissociate himself from Kant (while the notion of the a priori is not altogether abandoned) and let himself be uniquely guided, in the conduct of his research, by observable evolutionary facts, and primarily by the observation of animal behavior. This, precisely, is where I beg to differ, for along with an evolutionary natural history, man as a self-aware being endowed with reason also has a social history that spans the last 50.000 to 100.000 years and has been the primary condition for him to become what he is today. This social exchange among men and the capacity to communicate has had a massive impact on the development of the brain and is significant and ascertainable even at the level of evolutionary biology.[69]

In Germany, *evolutionary epistemology* was popularized most notably in the version proposed by Gerhard Vollmer.[70] But as early as in 1875, in a book called "*Kant und Darwin*," Fritz Schultze had already drawn attention, from a Darwinian perspective, to Kant's anthropological writings and his observations on "natural innate predispositions" that "*seem to be … innate, as it were*."[71] So the possible connections, or contrasts, as the case may be, between Kant and Darwin have already been addressed a long time ago. Today, it is obvious for every thinking individual that there is no way around scientific evolutionary biology, even though recent findings of molecular biology have increased the doubts about some of Darwin's assumptions regarding the emergence of new skills and the exclusive validity of the criterion of selection.[72] If anything, Theodosius Dobzhansky's famous assertion "*Nothing in biology makes sense except in the light of evolution*"[73] should be broadened to apply to any reflection on man, including anthropology and philosophy, because obviously the brain in its plasticity and the development of the cognitive structures have to a large extent been, and go on to be, formed in the course of evolution and human history.

When it comes to evolutionary epistemology, however, its very name already highlights the aporia of its approach: a *theory (!) of cognition* itself is per se nowhere inherent or *empirically ascertainable* in evolution. While there is no doubt that the investigation and clarification of all innate faculties deserves all the support it can get, there is no doubt either that this theory errs in its *naturalistic methodology*, that is, in its insufficient

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69 P.J. Richerson, R. Boyd, Not by Genes Alone: How Culture Transformed Human Evolution, University of Chicago Press Chicago, 1995.

70 Gerhard Vollmer, Evolutionäre Erkenntnistheorie, Stuttgart 1983.

71 Fritz Schultze, Kant und Darwin, Paderborn 2012 (Jena 1875), p. 67 (Kant: Anthropology from a pragmatic point of view (1798), On the character of races).

72 See, for instance: Jerry Fodor/Massimo Piatelli-Palmarini, What Darwin got wrong, London 2011.

73 Nothing in Biology Makes Sense except in the Light of Evolution, The American Biology Teacher, Vol. 35, No. 3 (Mar., 1973), pp. 125–129.

acknowledgement of the fundamental difference between *biological* and *mental, sociocultural* phenomena. The human mind is creative, spontaneous and autonomous, and when it conceives and then refutes theories or opts for a shift in perspective, this cannot be sufficiently explained by physical laws or genetic mechanisms even though it goes without saying that thinking always rests on biochemical processes. Nature, on the other hand, can only be understood by a creative-intellectual mental appropriation through rational thinking, theories, hypotheses and practical research.

Furthermore, it is of the essence to understand that while a large part of the evolutionary history of man may indeed be characterized as a *purely biological development*, the development of the crucial visual, cognitive and linguistic structures was both anatomical (formation of the entire vocal tract, descent of the larynx, refinement of the functionality of the hand, the jaw bones and the facial skull, and much else) and cultural, i.e., a consequence of the *cultural evolution* of man, his living in groups, learning by communication, working with tools, all of which follow a different dynamics from the initial biological one. Indeed, the "explosive" development of language and of man in general during the last 50.000 years has been much too rapid to be exclusively explained by the models of evolutionary selection; which is why it has been described as the "basic puzzle" of human development.[74] As it is, the social interaction among humans resulted in an acceleration of the learning curve, developing its own dynamics that largely escapes explanation by the evolutionary theory of natural selection and the biological-evolutionary paradigms alone. Therefore, when I speak of evolution or evolutionary processes in this book, this should always be taken to refer to both the biological *and* the cultural evolution of man since to do otherwise would mean to entirely miss the core features of this complex development and fall short of the argument. Moreover, I agree with Noam Chomsky that as a matter of fact, we still know too little by far about the dynamics and processes of evolution. There is a variety of morphological developments that cannot really be explained by the paradigm of "natural selection," with the DNA pool as its only basis, there must be other basic mechanisms such as those that are currently coming to the fore in the field of *epigenetics*. The Israeli researcher Eva Jablonka, an early critic of the dominating dogma of neo-Darwinism, refers to the "*epigenetic turn*" in this context, namely the concrete scientific insight that "*soft inheritance*," i.e., the transmittance of acquired characteristics to offspring, is indeed possible and not dependent on the DNA alone. Nessa Carey sums up this current scientific explosion in her book – written for a scientifically interested general public – as

[74] Michael Tomasello, *The Cultural Origins of Human Cognition*, Harvard University Press 1999, p. 2.

follows: "*The epigenetic revolution is underway*."[75] On the whole, however, we should always be wary of projecting our views and motives onto the process of evolution and had better stick to a rigorously rationalist approach. At any rate, while the history of *evolution* may well be told in terms of a *theory* of cognition, there is no way to deduce a genuine *theory of cognition* from evolution!

3. *Naturalism*, *materialism* and *realism* basically rely on the same fundamental *mechanism of self-delusion* as empiricism does because they simply fail to sufficiently realize what "*experience*," "*observation*," "*experiment*" and "*natural law*" really mean, how they really come about and that, in the final analysis, they all can invariably be reduced to the "mere" practice of *synthetic a priori thinking*. The concept of "*experience*," in particular, is invoked like a mantra by empiricism, but the only phenomenon that according to the actual doctrine could terminologically be described as experience is mere "*sense experience*," *impression* and *sensation*. This, however, is much less than what is generally understood – at least in German – by "experience" ("Erfahrung"). Life experience builds through my thinking about and *reflecting on* what has happened to me, on my responses, on the alternatives, if any, and on how to draw the conclusions from all this and, perhaps, change my behavior. All this is about reflection, weighing, comparison, evaluation, judgment, reasoning, rather than an accumulation of *sense experiences*. So, in German, thanks to the word "Erfahrung," a naïve reader can easily be won over for empiricism since he will think that what this is about is *experience* in the broad sense. Evidence of this fundamental error of scientism or naturalism can be found in many a statement. Manley Thompson, for instance, defines *naturalism* as follows:

"*The common core of meaning is probably the view that the methods of natural science provide the only avenue to truth.*"[76]

This, of course, immediately raises the question in what form things like *common core*, *meaning*, *view*, *methods*, *science*, *avenue* (*metaphorically*!) or *truth* may be present in *nature*, or read off as such from *sense experiences*? After all, Thompson chooses to use abstract concepts – so *how* did he come by them, in the first place? There is no getting around the fact that with the emergence of the *mind* as a free and creative self-awareness that is capable of conceiving and refuting theories as well as investigating relations "from a certain perspective," a completely novel quality appeared in nature (with "nature" itself a conceptual construct, whose meaning keeps

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[75] An easy-to-read introduction also for philosophers: Nessa Carey, The Epigenetics Revolution, Icon Books London 2011, p. 312; cf. also: Nessa Carey, Junk DNA, Icon Books London 2015.

[76] Manley Thompson, Naturalistic Metaphysics. In: Roderick Chisholm (ed.), Philosophy, Englewood Cliffs, New Jersey 1964, p. 183.

changing in the course of history), a quality that is in no way reducible, in purely physical terms, to matter (another conceptual construct). Atoms and subatomic particles, in turn, are not directly visible and therefore remain constructs of the mind (if highly plausible ones) whose definition is slightly modified from generation to generation (in keeping with the current state of the art). Thomas Nagel very concisely sums up the problem as follows:

"*The question is how to understand the mind as a product of nature in the full sense – or, to put it differently, how to understand nature as a system that is capable of producing mind.*"[77]

In recent years, naturalism has increasingly become attractive for empiricists who have realized that their inveterate tenets, i.e., the denial of innate knowledge and the passive copy theory of impressions are no longer scientifically tenable. Peter Carruthers' trajectory is an ideal-type example for this, and I will deal with it in the context of my criticism of empiricism.[78] In contrast, the critical-idealistic positions from Plato to Descartes to Kant to Neo-Kantianism as formulated by Ernst Cassirer are, I believe, a reasonable and state-of-the-art option. Ironically, although this option is today buttressed by the breathtaking progress of the sciences, *Neo-Kantianism*, as a consequence of the devastations caused by National Socialism[79] and the decades of marginalization by EAN philosophies, has been so weakened that it seems to lack even the strength to claim this undisputable "victory" for itself!

4. Finally, I would like to bring in a fourth, if somewhat removed, line of thought, namely that of Charles Sanders Peirce who was intensely concerned with the function of icon, index and symbol but also developed a sophisticated logical theory of signs, i.e. *existential graphs*.[80] As I see it, Peirce's sign theory, insofar as it is concerned with the representative

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77 Thomas Nagel, Geist und Kosmos. Warum die materialistische neodarwinistische Konzeption der Natur so gut wie sicher falsch ist, Berlin 2013, p. 107.

78 See Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York, 1995, as compared to Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford University Press, Oxford/New York 2005.

79 "Seen from the historical distance, it was not until the year 1933 that the crucial turning point occurred, stifling systematic philosophy in the spirit of Keo-Kantianism in Germany" (p. 41), and Kurt Walter Zeidler quotes Wolfgang Marx as saying that "referring to the end of 'Neo-Kantianism' is admissible only if there is reference, at the same time, to anti-Semitism and its catastrophic consequences." Kurt Walter Zeidler, Kritische Dialektik und Transzendentalontologie, Der Ausgang des Neukantianismus und die post-neukantianische Systematik, Bouvier Bonn 1995, p. 29.

80 Charles S. Peirce, Phänomen und Logik der Zeichen, Frankfurt/Main 1983, p. 64f. and p. 139f.

function of signs, is a mode of thought that is closely related to language but not per se comparable to *visual thinking* since the latter relies on thinking by purely visual channels – on an "*understanding of function*," to be precise – to apprehend and see through the *function* of objects, mechanisms, or chess pieces. The logic of *existential graphs*, it is true, involves an element of representation by signs, a communication of logical interrelations by graphic arrangements, structures and diagrams, but it still clearly goes in the direction I would like to propose in this book – in a more radical version, however, since I propose to go to the core of *visual thinking* where all linguistic-representative elements or factors are excluded. A number of initiatives has recently engaged in attempts to counter the monoculture of language dogmatics by bringing the visual element, i.e. diagrams and graphic representations, back to the fore and reclaiming them for the processes of scientific reasoning. One example is a paper by Catherine Legg: "What is a Logical Diagram?" where, closely following Peirce, she explores the issue of how to define a *logical diagram* and when to describe it as a logical diagram, in the first place.[81] Another example, if somewhat different, is the use of extreme magnification or reduction of pictorial elements and, primarily, schematization to visualize biochemical processes. Hans-Jörg Rheinbacher notes that especially in biochemistry, the conventional form of representation, i.e. *formulas*, are increasingly replaced by *visual schemata*:

"*This encourages a thinking in images, at the molecular level, that is easy to memorize, operating as it does in close proximity to the representations of everyday-life mechanical processes, and, more specifically, is well suited to play a productive role in experimentation.*"[82]

The structure of my book, given its multifaceted, complex and cross-cutting issues and innovative approach, is as follows: In a first step, a compilation of conceptual building blocks and elements will be offered to enable a step-by-step familiarization with the considerations and arguments that make plausible the *visual turn* in Book I. This, then, will be the basis for justifying the turn to a *rationalistic Neo-Kantianism* that is in keeping with and grounded in state-of-the-art science but nevertheless remains critical-idealistic in the spirit of Immanuel Kant in Book II.

In Chapter 1 of Book I, I propose to set forth in detail the current anthropological and evolutionary-biological considerations that show that for hundreds of thousands of years, early man had to exclusively rely on *visual thinking*, whether in the process of fabricating various tools or

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81 Catherine Legg, What is a Logical Diagram? In: Amirouche Moktefi, Sun-Joo Shin (eds.), Visual Reasoning with Diagrams, Springer Basel 2013, p. 7f.

82 Hans-Jörg Rheinberger, Sichtbar machen, in: Klaus Sachs-Hombach (ed.), Bildtheorien, Frankfurt/Main 2009, p. 141.

"reading" facial expressions and sign language, since language as we know it did not emerge until about 50.000 years BP. This will be substantiated by anthropological-biological evidence.

Chapter 2 will be dedicated to an account of the epic confrontation of *rationalism* vs. *empiricism*, highlighting fundamental misunderstandings, typical distinctive features and lines of argument. A case in point is the false claim, reiterated by EAN proponents, that rationalism as a form of idealism denies the existence of an independent external world of things. The only author to whom this would seem to apply, however, is himself part of British *empiricism* (George Berkeley) and actually just drew the absurd conclusions that follow from John Locke's misconceptions and, as a careful reading reveals, most notably suggests that we can know the things of the external world only in the mode of ideas or representations. No rationalist, from Plato to Descartes to Kant to Hegel, has ever denied the existence of reality, of things! This will be followed by a presentation of the essential arguments of empiricism and rationalism and the misguided and, today, hopeless position of the classic authors of empiricism (Locke and Hume).

Chapter 3 will offer a succinct yet in-depth, to the extent it is relevant to the issue, explication of the modern understanding of the process of seeing, i.e. "*vision science*." Since about 1980, the latter has undergone fundamental changes especially with respect to the interpretative construction of seeing by means of innate patterns, as already proposed by *gestalt theory* almost one hundred years ago. What this implies is that even before the "*intellectual synthesis*" of the objects is accomplished by the understanding in the process of object constitution, a "*figurative synthesis*" must have occurred, an interpretative structuring of the field of vision in terms of gestalt theory, to configure the possible objects in the visual field. This structuring will, then, provide the starting point for me to explain *visual thinking* and at the same time distinguish it from *conceptual* thinking. For even at the lowest levels of *vision*, the *impossibility of an unambiguous visual representation of the world* ("*the impossibility of visual perception*") was acknowledged by the sciences, with David Marr's milestone in the theory of perception the first to offer substantiation by scientific evidence.[83] Since the edifice of empiricism and positivism rests on the dogma, primarily dating from Locke and Hume, that all our knowledge *exclusively* comes from – or must be reducible to – experience (with "experience" terminologically restricted to *sense experience*!), the crucial basic tenet of empiricism, but also of all of EAN, is shaken to its foundation by the modern scientific theory of perception. The present investigation,

[83] David Marr, Vision: a computational investigation into the human representation and processing of visual information, The MIT press, Cambridge/London, 2010 (1982).

however, will also have to critically question Kant's concept of *intuition*, even though visual thinking does retain the link, consistently postulated by Kant, between thought and things. Moreover, investigation is needed into the issue of how to distinguish *visual thinking* from sensualism, and into the role of *intellectual intuition*, which was made the basis of his epistemology by Descartes, and that of *gestalt theory*, which at the time, i.e. the mid-20th century, was completely marginalized by the prevailing EAN dogma.

Chapter 4 addresses the question of precisely what "innate principles and ideas" (John Locke) or "innate knowledge" may mean and are supposed to mean. To this end, I will examine the concept of innate faculties, or innate knowledge and innate ideas, in Plato, Descartes and Kant, followed by a review of current scientific evidence for innate faculties. More and more human thought patterns and faculties, from the universal grammar of language to spatial perception to the concept of numbers such as 1, 2 or 3, have been revealed as *innate* by recent scientific studies. Today, the question rather seems to be which mental faculties are not innate! This is of central philosophical relevance because on the one hand, as mentioned above, it has a bearing on the second basic tenet of empiricism, namely its denial of each and every form of innate knowledge, while on the other, it is one of the key insights of *rationalism*. For without preexisting and pre-structured, as it were, knowledge the sole inflow of sense experiences would result in something like an ever-rotating kaleidoscope, or a "rhapsody of perceptions," as Kant described it in the "Critique of Pure Reason" (B 196), which could never enable the formation, with necessity, of solid, logical cognition. The scientific demonstration of such an innate, "pre-installed" knowledge is a triumph for rationalism and, at the same time, the downfall of empiricism's second tenet (of two).

Chapter 5 follows the scientific experiments of Hans G. Furth who was able to show, on the basis of empirical studies, that hearing-impaired children and adolescents (who were still called deaf-mute at the time) were as able to solve visually designed problem tasks as same-aged unimpaired children were. At the time, many of them came from disadvantaged social backgrounds, some showing signs of neglect. They could not speak, of course, and standardized sign languages such as DGS (Deutsche Gebärdensprache, German Sign Language) or ASL (American Sign Language) were not as widespread at the time as they are today. Sign language also includes facial expressions and movements of the mouth that are apprehended visually, it is not being *thought* in words or concepts. And yet these hearing-impaired children were able to solve most of the tasks as well as same-aged children with language skills were. How can this be if conceptual thinking, if language was the unique basis of thinking? There obviously is a very efficient form of thinking that is independent of lan-

guage and capable of solving visually presented logical problems. This would further support the hypothesis that thinking without language not only exists but may in certain domains even rival language-based thinking.

6. Furthermore, a short excursion into the world of chess will be undertaken to demonstrate that man is clearly able to solve highly complicated problems, that is, to assess a situation and to act on this assessment by visual thinking and without the constraints of language and to be extremely fast in doing this. What matters is not what is "given," the color or form of the chess pieces or the chessboard, but a thinking "across" pieces and many moves in advance. For an obvious confirmation that visual thinking exists, all you need is go to the nearest park and watch players involved in a game of so-called *blitz chess* where a mere five-minute span monitored by a timepiece is allotted to each match. Highly complicated logical chessboard operations that could never be thought through and carried out as rapidly by language-based thinking (documenting this reasoning in written or spoken words would fill innumerable pages) have to be processed within seconds. What we have here is pure *visual thinking* in action, in the "dispassionate calm of a knowledge dedicated to thought alone" (Hegel).

7. Finally, I will examine novel approaches to and discussions of the role of visual techniques for solving geometrical and mathematical problems. Here again much is in a state of flux, and many recent publications present evidence of the importance of visual thinking for solving a broad variety of geometrical problems. Interestingly, it is Wittgenstein who pointed out, in his "Remarks on the Foundation of Mathematics," that the easiest way to demonstrate the proof of the commutative law of multiplication is by rows and columns of dots.

He does so under the heading of "The mere picture":

o o o o o
o o o o o
o o o o o
o o o o o

And he goes on to note: "*… regarded now as four rows of five dots, now as five columns of four dots might convince someone of the commutative law. And he might thereupon carry out multiplications, now in the one direction, now in the other.*"[84] Especially in his late phase, Wittgenstein was increasingly intrigued by the issue of "*seeing as*," as apparent from his fragmented and telegram-style commentaries on the "rabbit-duck illusion"[85] and the

[84] Ludwig Wittgenstein, Remarks on the Foundations of Mathematics, Oxford 1978, IV, § 17, p. 233.

[85] The reversible figure, or flip-flop image, "rabbit-duck" is a well-known drawing from the German humor magazine *Fliegende Blätter* (1892), that was studied and

general role of vision in mathematics and geometry, but partly also from his reception of gestalt theory through the writings of Wolfgang Köhler. This is his comment on the rabbit-duck illusion: "You can see the duck and rabbit aspects only if you are thoroughly familiar with the shapes of those animals; the principal aspects of the double cross could express themselves in primitive reactions of a child who couldn't yet talk."[86] Cognition without language? Or, again:

"*But does this then show that it can't be a matter of 'seeing' in these cases – but it is one of 'thinking', perhaps? What makes this quite unlikely is that we want to talk about 'seeing' in the first place. So should I say that it is a phenomenon between seeing and thinking? No; but a concept that lies between that of seeing and thinking, that is, which bears a resemblance to both; and the phenomena which are akin to those of seeing and thinking (…).*"[87]

Nor does Wittgenstein fail to note the *suddenness* of a "visual experience," the immediate recognition of an aspect when seeing a rabbit, for instance:

"*And that's why the lighting up of an aspect seems half visual experience, half thought.*"[88]

"*Half visual experience, half thought*": by way of approximation to *visual* thinking, you can hardly be more explicit, but Wittgenstein had become too deeply immersed in his world of language games to once more (after all those wrong tracks since the "Tractatus") venture on uncharted ground.

Book II, Section III. will be dedicated to an in-depth analysis of that part of Plato's *Meno* Dialogue that deals with the solution to a geometric problem, my aim being to highlight the role that *visual thinking* plays in Plato and the key role it plays epistemically, in the process of cognition, for the emergence of the new, for the finding of creative solutions, for the formation of the concept, since speaking of *form* in terms of idea is *visual* in origin. The crucial role that geometry plays in Plato is also evident from the fact that whoever was accepted in his Academy was required to have a

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popularized by the American psychologist Joseph Jastrow. When you look at it, it flips or changes to show a picture of either a rabbit or a duck. Significantly, Jastrow deals with this in the chapter "*The Mind's Eye*" where he contrasts the interpretive performance of vision with the reproduction model of naïve realism. Cf. Joseph Jastrow, Fact and Fable in Psychology, Hardpress Publishing 2012 (1900), p. 295. Cf. also: Ludwig Wittgenstein, Ludwig Wittgenstein, Remarks on the Philosophy of Psychology, Oxford 1980, no. 70, p. 16e; and Philosophical Investigations, II, xi, p. 194e, where he refers to Jastrow, and p. 199e.

86 Ludwig Wittgenstein, Last Writings on the Philosophy of Psychology, The University of Chicago Press, 1982, no. 700.

87 Ludwig Wittgenstein, Remarks on the Philosophy of Psychology, Oxford 1980, Vol. II, no. 462.

88 Ludwig Wittgenstein, Philosophical Investigations, Blackwell Publishing 2009, no. 140, p. 207.

good knowledge of geometry; and maybe Plato's much-invoked "unwritten" doctrines were simply his observations regarding the procedures the disciples or probands relied on to solve geometric thought experiments.[89] The *Meno* will also provide the basis for an *in nuce* description of the meaning of rational *insight*, *intuitive evidence*, the "*grasping of a logical solution*," which has time and again been the object of EAN criticism of rationalism. Recent scientific insights into the *innate* faculties and ideas of man and the cognitive bases of the Aha! experience will open up new dimensions and provide a solid scientific grounding for Plato's mythical justification of "recollection" by the doctrine of reincarnation.

Section IV. is devoted to a discussion of the importance of *visual thinking* in Descartes, prominent as it is in his *Regulae*, *Discourse*, *Optics*, *Analytic Geometry* and, last not least, his *Meditations* and *Principles of Philosophy*. As it is, criticism of rationalism as voiced by empiricism often targets *intuitive evidence*, or "simple natures" as Descartes calls this function of the innate "natural light," for its alleged lack of justifiability. Perhaps here, again, new explanatory patterns will emerge since even a superficial reading of the *Regulae* will inevitably confirm that visual representation, visual thinking has a key role in Descartes. Having realized its eminent role in mathematics and especially geometry, Descartes follows the certainty of reason. *Visual evidence*, brought home to him through his intense study, following Plato, of geometry is adopted as a basis for his philosophy, an anchoring for certainty. While the *Regulae* have remained unpublished, the methodological elements Descartes had discovered when working on them were in essence retained even in his late *Principles of Philosophy*, which would seem to warrant their use. In his later work, however, i.e. the Meditations, he starts out from the "cogito" to establish the foundations of thought, which from the perspective of *rationalism* is a perfectly logical move. He seems to have believed that strategically, the certainty of visual thinking, of intuitive evidence, would not suffice. This is indeed intriguing, given that Wittgenstein starts out from language but detects its limits and in his late works investigates the visual forms of thinking under the heading of "picture" in order to come to a comprehensive idea of the forms of thinking, while Descartes, in contrast, realizes the indispensability and elementary function of *visual thinking* for geometry and the sciences at an early stage but at the same time sees that we need language to justify the more abstract and complex thoughts and that propositions need to be fundamentally anchored in the "ego cogito," in self-awareness.

Finally, in Section V., Kant's *Critique of Pure Reason* will be revisited in an attempt to re-organize the mediating functions between the two

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[89] See Konrad Gaiser, Platons Menon und die Akademie in: Jürgen Wippern (ed.) Das Problem der ungeschriebenen Lehre Platons, Darmstadt 1972.

"extreme ends" of *intuition* and *concept* in the sphere of the *imagination*, or *schematism*. For while Kant, on the one hand, starts out strictly from *concept* which he maintains is the only sphere where thinking occurs and to which *intuition* is diametrically opposed, his explication of understanding and reason, on the other, starts out from *intuition*, which after all raises the question at what level the transition from intuition to concept actually happens and whether the transformations that take place in Kant, from the "*figurative synthesis*," the productive imagination, to the function of schematism as "a hidden art in the depths of the human soul" (CPR, B 181) can be reconciled with current state-of-the-art vision science or require some degree of correction. With respect to *imagination*, I furthermore propose to explore Kant's reference to the "*common but to us unknown root*" and find out whether this might suggest new and interesting explanatory patterns. Furthermore, regarding the explication of imagination given by Kant in the B edition, I will attempt to show at what point Kant arguably failed to see, or account for, *visual thinking* as an independent function in his system because for him, thinking could only be conceptual in nature.

In Section VI., starting out from a historical synopsis of neo-Kantian currents, I will define those elements of Kantian doctrine that should be indispensable for any Neo-Kantianism, as well as those that were felt to need complementing or revising. The insights gained up to this point in this book will then be synthesized into a modern, science-oriented and rationalistic *Neo-Kantianism*. The latter cannot ignore the evolutionary development of man and the basic cognitive structures which, like universal grammar, are largely *innate*. Similarly, Kant's doctrine of perception, and in particular *intuition* and the synthesis of the *manifold*, need to be updated in keeping with the insights of modern *vision science*. But there also will be a description of the non-circumventable critical-idealistic structure of cognition that unfolds in the form of the self-aware, spontaneous mind through a priori thinking. It goes without saying that language is the medium of the mind, and conceptual abstract thinking is, as Hegel used to emphasize, at the same time the *universal* that has always already transcended the particular. Yet in its elementary beginnings our thinking, without which we could never have reached a higher level of development, rests on *visual thinking*, and we need the faculty of *intuitive, visual thinking* as described by Descartes in terms of "*simple natures*," natural light, the intuitive evidence of *clear* and *distinct* (*adequately differentiated*) cognition.

Section VII. will outline the way to a modernized, *rationalist Neo-Kantianism*. As it is, the latter may well turn out to be more conclusive, more realistic, more scientifically and logically grounded than any EAN philosophy and, what is more, to have the potential to not only be a sci-

ence-affine worldview but, at the same time, to *demonstrate and ensure the rationality of culture*. In a final *Excursus* I will, then, present an innovative approach to an understanding of *concept* which, following Cassirer's concept of "*symbolic pregnance*," reveals the "*primal layer*" of the concept without relapsing into the circularity of empiricist concept formation. If in my argumentation I have somewhat excessively quoted the theses and propositions set forth by the advocates of the prevailing EAN dogma, as often as not from Anglo-American sources, I have done so more or less along the lines of Karl Marx' statement that "these petrified relations must be forced to dance by singing their own tune to them!";[90] meaning that reiterating EAN tenets, theses and theories is the best way to highlight their actual indefensibility and inconsistency.

[90] Karl Marx, A Contribution to the Critique of Hegel's Philosophy of Right, 1843, Introduction, accessed: https://www.marxists.org/archive/marx/works/1843/critique-hpr/intro.htm

# II.
# Preparing the turn to a rationalistic Neo-Kantianism: Starting points and guiding considerations

## 1.
## An evolutionary biology perspective on the development of visual thinking and the origin of language

In the following, I will deal with these fields in some more detail than what one might expect to find in the usual philosophical text to establish the right position of *visual thinking* and the *origin of language* within the evolution of man. But the last ten or twenty years have seen such a host of groundbreaking scientific revolutions that anyone who is not permanently involved has no idea of what is going on. On the other hand, there is a great variety of publications on the issues of language, evolution, perception etc. that fail to explain concretely and in accordance with the state of the art of their day what the latter are supposed to mean. Since the whole issue of innateness, visual perception, the origin of language and, thus, the evolution of man has a pivotal role for the present volume, a somewhat more detailed account of these fundamentals seems to be in order. In the above, I have variously referred to "evolution" or the "history of evolution" without actually spelling out what exactly these terms mean from the perspective of a rationalistic Neo-Kantianism. Advances in molecular biology and genetics have been made, and continue to be made, at an exponentially growing rate. Supported by groundbreaking biotechnological methods and computer models, they have enabled us to much better understand, as compared to what was possible just a few decades ago, the history of evolution, its mechanisms and its "logic," and to come to a more conclusive temporal reconstruction of its progress, a more exact delineation of epochs and a much more accurate account of the systematic and gradual evolution of humans and their cognitive capabilities. The practical methods and products of genetic engineering – cloned sheep, modified intestinal bacteria that serve medicinal purposes, and the Human Genome Project that was completed, in 2003, with the mapping of the almost 20,000 genes of man – provide striking examples of and evidence for this progress. At the same time, just as in philosophy, numerous dogmas (in their heyday, both *neo-Darwinism* and *empiricism* used to invoke a "central dogma") and ingrained beliefs regarding the understanding of evolution have been substantially challenged, if not altogether abandoned, and things have begun to move even with respect to some of the fundamental doctrines of neo-Darwinism. Pigliucci and Müller comment on this rapid development as follows:

"*All of these molecular processes clearly demolish the alleged central dogma, and yet do not call for the rejection of any of the empirical discoveries or conceptual advances made in molecular biology since the 1950s.*"[91]

However, caution should be used when dealing with the "evolutionary imprinting" of man since we should always keep in mind that a large part of this evolutionary history also comprises developments of a non-biological, that is, cultural-cognitive nature and that the critical-idealistic point of view, and Kant's "critical limit" that needs to be systemically observed in any discourse about "evolution" is not violated in the process. In this sense, Thomas Nagel's reflection on evolution ("Why the Materialist Neo-Darwinian Conception of Nature is Almost Certainly False") would seem to be more to the point since it acknowledges the unique position of the *mind* in relation to evolution.[92]

But let us return to the ongoing paradigm shift in the theory of evolution. Modern research in molecular biology, and in particular *epigenetics* has shown that while the central dogma of neo-Darwinism formulated by Crick and Watson in 1958[93] – the sequence from DNA to RNA to Protein – is indeed the important basis of the evolutionary system, it is far from sufficient when it comes to explaining *all* the phenomena observed.[94] This, then, was the starting point for a host of novel reflections and hypotheses. A fundamental rethinking is under way in molecular biology, genetics and evolutionary theory. Thus, Müller-Wille and Rheinberger, for instance, note:

"*To the extent that concepts that conceive of genes as atomic hereditary factors have lost their hold, the idea of a molecular bundle of genetic and epigenetic mechanisms has taken more and more concrete shape, which means that today not only a targeted re-programming of cells but even their synthetic production has come within the reach of what seems possible.*"[95]

This implies that there is not only the simple, "replicating," linear relation of DNA to RNA to the formation of the respective proteins, nor the directly replicating relation from *genotype* to *phenotype*, but an additional myriad of modifying, complex, dynamic processes of control, regulation and feedback, all of which result in an extremely complicated "dialogue" between genetic predisposition and the environment:

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91 Massimo Pigliucci, Gerd B. Müller, Evolution – The Extended Synthesis, MIT Press 2010, p. 9f.

92 Thomas Nagel, Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature is Almost Certainly False, Oxford University Press 2012, p. 73.

93 Staffan Müller-Wille, Hans-Jörg Rheinberger, Das Gen im Zeitalter der Postgenomik, (Suhrkamp) Frankfurt/Main 2009, p. 80.

94 Ulrich Kutschera, Evolutionsbiologie, Stuttgart 2015, p. 354f.

95 Staffan Müller-Wille, Hans-Jörg Rheinberger, Das Gen im Zeitalter der Postgenomik, (Suhrkamp) Frankfurt/Main 2009, p. 15.

"*Meanwhile we have even come to know a class of mechanisms whose function is addressed as the editing of messenger RNA. Here, enzymes act on the nucleotide sequence to effect a targeted modification of the initial transcript, which means that there is no co-linearity any more between the DNA gene and the resulting protein.*" (loc. cit., p. 85f.)

This, then, is the crucial point, which affects the central dogma of genetics:

"*The continual increase in complexity of the molecular biological concept of a gene is taken even further at the third level, the level of translation. Not only can transcripts be read from different starting points but the reading process itself may include a compulsory jump in the reading frame. Also, post-translational modifications of proteins may happen when amino acids are modified or even exchanged… Molecular biologists such as Michel Morange have come to the conclusion that an exact definition of the concept of a gene is today impossible (Morange 1998, Fogle 1990, Carlson 1991, Portin 1993).*" (loc. cit., p. 85f.)

Now, while this does not mean that a prince will grow out of the DNA of a frog, it does mean that the relations involved are much more multifaceted and complex than people were able, or sometimes perhaps even willing, to imagine in the heyday of the dogmas of *neo-positivism*, *neo-Darwinism* and *behaviorism*. Referring to the groundbreaking objections raised by Jablonka and Lamb,[96] the authors also note that by now even Lamarck's theory, once ostracized and vilified, *that acquired traits can indeed be inherited* is back on the agenda, driven by new insights into epigenetic interventions and modifications, such as, for instance, methylization, that is, genes being "turned on and off," the underrated function of histones, and many other mechanisms. It should further be noted that research on the so-called micro-RNA and on those DNA sequences that are disparagingly described as "junk DNA" is still in its very first stages, all of which is sure to hold surprises by the score. In this context, Bernhard Kegel critically notes that free, undogmatic reflection also on proscribed theories such as that of Lamarck should indeed be possible and that political pressure should not result in a ban on thinking:

"*Thus, inheritance of acquired traits, too, is a reality, the Lamarckian dimension does exist. Scientists, and with them society as a whole, have for decades turned a blind eye on this, which is probably due, among other things, to a deep-seated and also politically motivated aversion to the phenomenon as such. (…) Even today, Lamarck's life work tends to be reduced to the example of the giraffe's neck and, thus, exposed to ridicule – a caricature we have Ernst Mayr and the other precursors of Modern Synthesis to thank for. They were busy establishing the foundations of evolutionary theory, and like any novel discipline this one, too, needed something of a foundation myth and a line of ancestors who could be divided into "villains" and "heroes," into those*

[96] Cf. Eva Jablonka, Marion J. Lamb, Epigenetic Inheritance and Evolution: The Lamarckian Dimension, Oxford University Press Oxford 1995.

*who had understood early on what was important and those others who had not. Lamarck was assigned the role of the arch villain. Among the heroes, the shining light was the German biologist August Weismann, given that the barrier, named after him, between germ plasm and somatic plasm had definitely exorcised the specter of Lamarckism from the realm of serious scientific theories.*"[97]

Also, there are more and more critical approaches and novel perspectives that further enrich the debate about Darwinism, all of which is heading to a paradigm shift. Cases in point are, for instance, "What Darwin got wrong" by Jerry Fodor and M. Piatelli-Palmarini,[98] or "Evolution – The Extended Synthesis" by Massimo Pigliucci and Gerd B. Müller,[99] to mention but two among the host of new publications.

New lines of research in evolutionary biology that have developed in response to the new findings, for instance the discipline of so-called *evo-devo*,[100] will no doubt reorient scientific development away from the one-dimensional dogma and toward a freer reflection on evolution. In this respect, Müller-Wille and Rheinberger arrive at a conclusion that would have been unthinkable only fifteen years ago:

"*All in all, the genotype-phenotype relation, far from becoming clearer and simpler is getting more and more complex and intricate – its complete disappearance as a distinction being a more and more likely outcome at the dawn of the 'era of post-genomics'. Thus, epistemically speaking, the concept of a gene has been so productive not because it has once and for all provided an answer to long-standing universal questions but because it has allowed for ever new, ever more specific and ever more intricate questions to be raised.*" (loc. cit., 134f.)

Moreover, we still do not really and to the last detail understand the how – exactly how, from a molecular biological point of view, many of the essential processes and operations take place in the genes and cells. It is only bit by bit that the growing insights of molecular genetics provide some *idea* of what is actually going on within and among cells. This implies that if we want to understand the course of evolution we definitely need to methodically start out from the existing fossils and evidences, using them as a basis for hypotheses and conclusions in accordance with state-of-the-art biological knowledge. This is why, in their reader "Evolution," written in a relatively unbiased manner, J. Zrzavý and colleagues note:

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97 Bernhard Kegel, Epigenetik – Wie unsere Erfahrung vererbt wird, Köln 2015, p. 296f.

98 Jerry Fodor/Massimo Piatelli-Palmarini, What Darwin got wrong, London 2011.

99 Massimo Pigliucci, Gerd B. Müller, Evolution – The Extended Synthesis, MIT Press 2010.

100 Sean B. Carroll: Endless Forms Most Beautiful: The New Science of Evo Devo and the Making of the Animal Kingdom, Norton 2005; Gerd B. Müller, Evo-Devo as a discipline, in: Alessandro Minelli, Giuseppe Fusco, Evolving Pathways, Cambridge University Press, Cambridge 2008, p. 5ff.

*"We need to accept the fact that for any schema of past phylogenesis, we can think of a series of alternative evolutionary histories that are perfectly in harmony with this phylogenesis. Reflecting on whatever phylogenetic event, we come to the conclusion that there is no evolutionary process of which we can say with absolute certainty that it definitely happened in the past. Instead, we always find several different evolutionary processes whose involvement cannot be definitely ruled out."*[101]

For all of these reasons, it is anything but easy to come to a clear and precise definition of exactly what is to be understood by the evolution of man, and of exactly how evolution actually proceeds. Basically, the only thing for us to go by is the evidence provided by fossils and the finds of the life of early man, on the one hand, and the new methods and insights that molecular biology and genetics keep coming up with, on the other. If, for instance, the bony remains of early humans of a certain epoch can be shown to lack the anatomical structures that would allow them to perform a specific action while at the molecular biological level, these remains can be relatively precisely located in time, then we can assume with a high degree of certainty that for anatomical reasons, early humans at a certain epoch were technically unable to perform a specific action. In this respect, then, there is a concrete increase in knowledge. Therefore, the still partly unresolved issues of the theory of evolution should not be construed as evidence that as a theory, it is too weak or too much of a "puzzle." For a definition of the concept of evolution, I propose to go by the writings of Zrzavý et al. whose approach to the questions of evolution is scientifically sound as well as accessible to a more general public. Here is what is offered as definitions of evolution:

"*By evolution, we understand the progressive development of any system with a 'memory', i.e., a system that responds to external influences and does so depending on experiences made in the past. … Biological evolution is, of course, of particular interest: it provides an explanatory model for the way different organisms (from Greek organismos: cluster of organs) emerge over time, that is, complex systems that respond to stimuli, grow, evolve, keep their internal milieu constant, maintain their integrity, and procreate. In the course of evolution, organisms change; they adapt to the diverse conditions that allow them to extract and process energy and substances from the environment – be they amoebae, potatoes, nematodes or humans.*"[102]

This definition comprises several essential points: firstly, evolution is a "*progressive development,*" that is, in a way, a potential accumulation of "*information*" gathered in an ongoing "dialogue" with environmental requirements. In this context, the authors quite rightly note that we are dealing with a "*system with a memory.*" This means that the "system of

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101 J. Zrzavý, H. Burda, D. Storch, S. Begall, St. Mihulka, Evolution, (Springer) Berlin/ Heidelberg 2013, p. 47.

102 J. Zrzavý, H. Burda, D. Storch, S. Begall, St. Mihulka, Evolution, (Springer) Berlin/ Heidelberg 2013, p. 2.

evolution" can only function successfully if "information" can be stored, retained and passed on to subsequent generations at a profit. This consideration will be of relevance, among others, in the discussion about "innate knowledge." For the ability to retain "successful" structures and functions in "memory" and to pass them on to the next generation seems to be an essential formula for success of biological evolution. Empiricist epistemology, however, claims the very opposite, namely that we are invariably brought into the world with our cognitive functions a complete *blank slate*, a *"tabula rasa"*; a condition that is assumed to exclusively hold for the mental faculties. So while all cell systems, organs and functions of the human body, being part of an organic structure, are endowed with naturally inherited structures and, thus, "prior knowledge," exactly the opposite is supposed to be true for the neural cells of the brain only, although, at yet another level of the discussion, such a dualism, i.e. the epistemic separation of body and mind, is exactly what is refuted by EAN. From this it follows that one of the EAN positions is contradictory. Either there is monism and no "ghost in the machine," but then the machine is subject to the laws of evolution and there can be no "tabula rasa" but inheritance of "information," "faculties" and "knowledge" just as in all other organs.

Another characteristic of evolution described by the authors is response to stimuli and maintenance of normal body or cell functions. But the purely conservative properties of the system are insufficient to explain its successful survival under quickly changing conditions that at times were extremely hostile to life, and its development toward ever more complex and advanced organisms and functions over many hundreds of millions of years. There can be no doubt, therefore, that there must be a complement in terms of what is described as the "emergence of something new," i.e. the creative element of evolution that enables concrete "adaptation." The earlier dogmatic theory that only allows for selection and random mutations is essentially unable to explain, single-handedly, the emergence of highly complex new organs and functions that serve a certain purpose, especially not within the given time spans. According to this theory of natural selection, something fundamentally new arises because the reading and transmission of genetic information always goes along with a certain rate of errors that, through mutations, may result in new properties and capabilities. Of the latter, those that serve the purpose survive while individuals with less adequate functions become extinct. But it is very difficult, if not impossible, to rely on nothing but random "replication errors" in the DNA to explain the emergence of a function as complex as language within such an extremely short – from an evolutionary point of view – time span, or the development of an organ as complex as the eye. There must be an additional mechanism that is more purpose-geared and faster and allows for the rapid formation of urgently needed

capabilities. And here again, there is a host of novel developments and findings, so even these authors, for all their unmistakable aversion to Lamarck's theory, must concede that the final word has not yet been said and that today we can no longer speak of a unified "dogma":

"*Molecular biology offers ever more powerful reasons why evolutionary biology should begin to take Lamarckian ideas seriously (though what is meant here is not Lamarckism in its original sense). For it is not true that Darwinism is the only way of explaining the emergence of adaptive properties. Lamarckism even explains adaptations in a much simpler and much more direct way. While in Darwinian competition, adaptation processes are just a byproduct (for Darwinian organisms don't adapt, they compete for procreation) Lamarck's organisms are actually concerned with adaptation as such. According to Lamarck, an organism acquires certain adaptive properties 'deliberately' and directly and passes them on to offspring without selection of the superfluous.*" (loc. cit., p. 140f.)

However, we know of more and more cases where properties acquired during the lifetime can be *inheritable*. Think, for example, of the current explosive rise of short-sightedness in Asia where the condition has spread to up to 80 percent of the population within one or two generations, not at a functional level but due to an anatomically ascertainable change of the eyeball, the likely reason being the new hardware and hand-held devices and much less time spent outdoors; all of which evidently cannot have happened by selection of the normal- or far-sighted. Again, we have to admit that many processes and mechanism are still unclear or unknown. I am discussing all this in some detail here because at the heyday of the dogma, selection, adaptation and "survival of the fittest" (and also social Darwinism) used to be referred to as completely established facts, which from today's point of view must be challenged as too sweeping a statement.

Extreme caution must be used, however, when it comes to projecting purposive-rational reasoning and human motives onto the processes of evolution, for the rather obvious result is a circle, as the debate about the so-called "evolutionary epistemology" has repeatedly shown.[103] This is why, so far, I have put all biological processes in quotation marks since otherwise they would all qualify as just this brand of flawed projections. We are always dealing, as stated above, with explanatory models that rely on those fossils and those relics of early humans that are available today, or on the insights of molecular biology. From a perspective of rationalistic Neo-Kantianism, however, we need to take into account that these models, this hypothesis, as well as the critical-idealistic constellation in general

[103] See, among others: Robert Spaemann, Peter Koslowski, Reinhard Löw (eds.), Evolutionstheorie und menschliches Selbstverständnis, Weinheim 1984; esp.: H.M. Baumgartner, Die innere Unmöglichkeit einer evolutionären Erklärung der menschlichen Vernunft, p. 65.

is always informed, in the way described by Kant, by our form of perception and our mode of knowing. Therefore, while it is right to propose an "explanatory model" or to refute models we believe to be outdated or wrong, we should refrain from attributing "goals" or "purposes," let alone a "strategy," to evolution even though, using the "guideline of reason," we may assess the adequacy of these processes with respect to certain purposes.[104] By the same token, we need to criticize and avoid the "disguised realism" of evolutionary epistemology because in reality, there is no "epistemology" in evolution (but, conversely, there is man who can develop a theory of evolution due to his way of thinking).[105]

If we now look at the evolution of man with these fundamental considerations in mind it is evident that in contrast to many other species that are much older and have quite successfully stood their ground, (early) man has evidently and consistently progressed to a "higher" stage of development. The driver of this evolution clearly is the quantitative and qualitative enlargement of man's *brain*, in contrast to his bodily frame that has become rather more clumsy and weaker as compared to other primates with whom we share almost 99% of our genetic makeup. Why it is the brain of humans that has shown this remarkable growth rather than that of other, much older, animal species cannot be answered from today's point of view. At any rate, modern molecular biology with its novel methods will allow us to much better understand these processes of adaptation and, more specifically, reorganization undergone by the neurons in the brain. Also, these novel methods will help us to advance our understanding of the evolutionary development of early humans and Homo sapiens.

Thus, genetic relationships can be reconstructed on the basis of hereditary DNA patterns, on the one hand, while on the other, a new method can be brought to bear as a result of Allen Wilson's (1987)[106] research on mitochondria, the cell's "power stations," and their peculiar inheritance. Unlike DNA, mitochondria are not contained in the nucleus but in the cell's cytoplasm and are not inherited through sperms but, in most cases, only through the mother, which allows for a reconstruction of their inheritance line. Since due to mutations, genetic information will change over time – a process referred to as the "ticking of the molecular clock" – this offers an entirely novel and relatively precise method for dating and establishing temporal processes and general contexts in the early history

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104 On this debate, see also: Wilhelm Lütterfels (ed.), Transzendentale oder evolutionäre Erkenntnistheorie? Darmstadt 1987, Einleitung.

105 R. Spaemann, P. Koslowski, R. Löw (eds.), Evolutionstheorie und menschliches Selbstverständnis, Weinheim 1984; R. Löw, Bericht über die Schlußdiskussion, p. 95.

106 R.L. Cann, M. Stoneking & A.C. Wilson, Mitochondrial DNA and human evolution; Nature 325, 31–36 (01 January 1987).

of man.[107] This is not the place to go into the technical details, but it is this method that today allows us to say with certainty that the cradle of humankind was in Africa and that there were several waves of hominid migration from there to the other continents. Moreover, these new methods enable us to prove that all Homo sapiens-related finds made up to now, that is, all ancestors of man, stem from the same genetic material. Incidentally, these scientific findings also cut the ground from under racism in whatever form because in the final analysis, all humans come from the same African-based genetic pool, from the same "primordial mother." At the same time, mitochondrial genetics contributes evidence that when Homo sapiens had migrated from Africa to the Near East and Europe, he scarcely mixed with the local Neanderthal populations. On the other hand, the mitochondrial clock helps to date the emergence in and migration from Africa of Homo sapiens with greater accuracy. Thus, man, i.e. Homo sapiens proper, must have developed since about 200,000 years ago, and the migration from Africa and subsequent populating of all continents began at about 80,000 to 50,000 years ago.[108, 109]

In Africa, this development started out from the so-called Australopithecus of some 3 million years ago. These first hominids who still resembled the great apes were the first to be bipeds, that is, to have upright posture and gait which, at the functional level, freed their hands for other activities[110] and changed their field of vision, allowing for a more distant view. Reconstruction of the brain volume of these first early humans revealed it to be at about 600 cubic centimeters. Like primates, they were able to perceive color, and an estimated half of the primate brain is supposed to be in some way or other concerned with the coordination and analysis of vision.[111] "The oldest known stone tools are about two and a half million years old," although it is unclear whether they were already made by members of the genus Australopithecus.[112] About 2 million years ago, Homo habilis evolved, and with him some more solid evidence of incipient purposive-rational intelligence appeared, as shown by various stone tools that were dated at about 1.8 million years ago. This is a first decisive turning point, for Homo habilis most certainly had no language but was obviously able to manufacture various, if simple, stone tools. This working on stone and, perhaps, wood to manufacture tools – the wooden

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107 Josef Reichholf, Das Rätsel der Menschwerdung, München 2011, p. 15f.

108 Josef Reichholf, Das Rätsel der Menschwerdung, München 2011, p. 21f.

109 Douglas Palmer, Die Evolution des Menschen, London 2010, p. 8.

110 Gisela Grupe et. al., Anthropologie, Heidelberg 2012, p. 64.

111 Michael Corballis, The Gestural Origins of Language. In: Christiansen/Simon Kirby (ed.), Language Evolution, Oxford University Press, Oxford/New York 2009, p. 202.

112 Gisela Grupe et al., Anthropologie, Heidelberg 2012, p. 41.

ones not preserved due to their perishable nature – suggests a change in the motor function and the anatomy of the hands, accompanied by a parallel development of the brain. Interestingly, a significant part of the cerebral cortex of humans is also dedicated to the representation, or support, of the hands. For hundreds of thousands of years, early humans worked on and with stone tools, and it stands to reason that turning and rotating as well as working on these objects helped to induce and form visual thinking, just as we are today able to rotate the mental representations of letters or objects, an operation established by Shepard and Metzler in their classical study.[113] Regarding the manufacturing of stone tools, Douglas Palmer notes:

"*… that the makers had both the dexterity and the cognitive abilities needed for this work. They not only mastered the skill of systematically knapping stones to obtain sharp-edged blades, they were also able to appreciate the quality and suitability of the various rock types. To be able to do this, they must have had a very precise mental image of the type of tool and of the procedure to use in each case. They were not randomly testing but relied on proven technology that had been learned, elaborated and passed on over many generations.*"[114]

Moreover, it is important to bear in mind that the maker of a stone tool had to have a mental image of the finished product, like in the image used by Aristotle in his famous example of the causa formalis (The Metaphysics 1013a) to describe how a sculptor needs to have a mental image of the form or gestalt of a statue before he starts to cast it in metal. Regarding the manufacturing of stone tools, Stephen Mithen explains:

"*This type of thinking is absolutely essential for the manufacture of a stone tool like a handaxe.* One must form a mental image of what the finished tool is to look like before starting to remove flakes from the stone nodule. *Each strike* follows a hypothesis *as to its effect on the shape of the tool. As a consequence Tom Wynn felt confident in attributing formal operational intelligence, and hence a fundamentally modern mind, to the makers of handaxes.*"[115,116] (my emphasis, WW)

Let us therefore retain, for the time being, that these early humans had to have both a "mental image" of the tool and "formal operational intelligence."

The tool thus documents that there was an understanding of *purpose*, i.e. of something general, the presence of a *mental image* of the finished

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113 Roger N. Shepard and Jacqueline Metzler, Mental Rotation of Three-Dimensional Objects, Science, New Series, Vol. 171, No. 3972 (Feb. 19, 1971), pp. 701–703.

114 Douglas Palmer, Die Evolution des Menschen, London 2010, p.192.

115 Steven Mithen, The prehistory of the mind, London 1996, p. 35.

116 See also: Thomas Wynn, The intelligence of Oldowan hominids. Journal of Human Evolution 10, pp. 529–41, or Thomas Wynn, Frederik Coolidge, How to Think like a Neandertal, Oxford University Press 2012.

object and of the *procedure* one needed to follow to obtain this imagined object. What many all commentators, however, fail to realize is that the early humans of this period could not speak, had no language as we know it and, therefore, were incapable of language-based conceptual thinking! But how, then, were they able to have something "in mind"? What we can say, at any rate, is that early man must have worked in keeping with the Aristotelian causa formalis as well as finalis for he had the final purpose of the manufactured tool in view. He furthermore knew that this tool would be used at a later time, so he had "in mind" certain processes in time and space; let alone the many other cognitive and logical achievements involved, such as the knowledge, choice, storage, combination of materials, an understanding of simple physical laws (lever) and, of course, the formation of makers of stone tools and the transmission of expertise. So what the makers of such tools needed to have was an understanding of the *function* of each tool as well as of the steps to follow for producing it, thought visually but not expressed in concepts. That is, they had to understand that something had to be made in a specific way for a specific purpose without language and conceptual thinking to rely on. What they must have had, in contrast, was a non-conceptual understanding of function. The latter may have been primitive, but it is still more than the mere "seeing" or "imagining" of an object, it is thinking without language!

That early humans must have had some form of visual thinking even before the emergence of language is also stressed by Peter Carruthers:

"*It seems quite likely, then, that Homo ergaster would have been capable of generating visual and other images, even if this capacity was rarely used outside of the demands of object-recognition. In fact, however, there is evidence of the use of rotated visual images by members of Homo ergaster some 400,000 years ago. This comes from the fine symmetries that they were able to impose upon their stone tools, while using a reductive technology that requires the planning of strikes some moves ahead. For Wynn (2000) makes out a powerful case that this can only be done if the stone-knapper is able to hold in mind an image of the desired shape that the stone would have when seen from the other side, rotating it mentally in such a way as to compare it with the shape of the stone now confronting him. Then, given that members of Homo ergaster were capable of forming and manipulating mental images outside of the context of object-recognition, it may well be the case that they also used such images for purposes of mental rehearsal more generally. If they could form an image of an action they were about to perform, for example, then that image would be processed by the input systems in the usual way, and made available to the suite of central modules, some of which might then generate further predictions of the consequences of that action, and so forth.*"[117]

[117] Peter Carruthers, Distinctively Human Thinking, in: Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Vol. 1, Oxford University Press, Oxford/New York 2005, p. 79.

What this is about, however, is more than the forming of mental images, it is, as mentioned above, about the purposive-rational manufacturing of an object, guided by the thought of a goal, that is, a *causa finalis*, which clearly already implies purposeful thinking rather than simple imagining. However, in this context, eidetic, general, ideal-typical imagining is only the root, the "Urschicht" ("primal layer," Cassirer), from which the understanding of function and, from the latter, conceptual thinking, the concept of function, will by and by arise.

For our present purpose, it is impossible to enlarge upon the geographical range, various lines and branches, sites of finds and developmental stages of early humans. Rather, our focus here is on those phases of the evolutionary timeline where a distinct increase in brain size and technical skills is ascertainable while language as we know it had not yet emerged. This is the period from about 800,000 BP to about 200,000 BP, that is, until the appearance of Homo sapiens between 200,000 and 100,000 BP. In Europe, it is the phase of Homo heidelbergensis, named after the site near Heidelberg where he was found in 1907. Reconstruction of the brain volume of Homo heidelbergensis resulted in about 1,300 cubic centimeters, which is already that of modern man. Of course, volume must not be taken as a direct indicator of the brain's structure and performance, but a certain correspondence between volume and performance can nevertheless be observed over these long stretches of time, with two periods, as mentioned above, where a distinct enlargement occurred.[118] In 1993, stone tools, bones of slaughtered rhinoceroses and the tibia of a man who stood at about 180 cm tall were found in Boxgrove (South of England).[119] As the killing of rhinos could hardly be the feat of a single hunter, this suggests that there was organized hunting, which in turn suggests a planned, strategic approach. The level of skills at this period is also evident from some spears that were found near Schöningen in Germany in 1995: seven wooden spears about 400,000 years old that were expertly made and weighted and are said to equal the qualities of modern javelins used in athletic competitions.[120, 121]

One thing that was of special importance for ice age survival and food preparation was fire. Even though the first deliberate use of fire at more than a million years ago is sometimes called into question,[122] fire pits dating from the period of 400,000 years ago have been ascertained in Schöningen in Germany as well as Beeches Pit in England. It is also as-

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118 Steven Mithen, The prehistory of the mind, London 1996, S.

119 Douglas Palmer, Die Evolution des Menschen, London 2010, p. 182f.

120 Friedemann Schrenk, Die Frühzeit des Menschen, München 2003, p. 101.

121 See Hartmut Thieme, Die Schöninger Speere, Mensch und Jagd vor 400 000 Jahren, Stuttgart 2007.

122 Richard Rudgley, The Lost Civilisations of the Stone Age, New York, 1999.

sumed that fire was used for working on materials.[123] These finds convey the picture of a technically relatively advanced society of hunters who lived and hunted in small groups, were experts in the manufacturing of tools and weapons and knew how to master fire; all of which Homo heidelbergensis achieved without spoken language. In addition, he must of course have had visual-cognitive skills such as face recognition, the reading of facial expressions and sign language, the "reading" of tracks and signs in the wilderness. How, or rather, in what medium did he think?

From 200,000 BP onward, man began to evolve in Africa from Homo heidelbergensis and comparable precursors and, as an independent line, Neanderthal man who lived between about 200,000 and 30,000 BP in Europe and the Near East. In his interesting book "The Prehistory of the Mind," Stephen Mithen comments on this epoch of early man and Neanderthal man as follows:

"*Although the Neanderthals had brains as large as ours today, their culture remained extremely limited – no art, no complex technology and most probably no religious behavior … we will see in how many ways Neanderthals were very similar to us, such as in terms of their brain size, their level of technical skills as evident from their stone tools. Yet in other ways they were very different, such as in their lack of art, ritual and tools made from anything but stone and wood.*"[124]

The greatest puzzle, as described by Mithen, is the discrepancy between the Neanderthals' technical skills and their lack of art and culture in contrast to what has been found for Homo sapiens. We are confronted with a way of thinking that is fundamentally different from that of man. It is also unclear why at about 30,000 BP, the Neanderthal population exited from history quite rapidly and unsung, as it were. One has to bear in mind that the immigration of modern man into Europe was going on since about 40,000 BP. There is a lively debate about whether the rapid extinction, of Neanderthal man was due to violence or to natural causes such as the growing scarcity of big game. In the competition for scarce resources, humans with language skills can be assumed to be at an advantage tactically and technically as well as in their weapons technology. Also, there is little genetic evidence in the human genome of interbreeding of modern man and Neanderthals, and in the genetic material of all Neanderthals hitherto found and analyzed, there is no genetic trace at all of interbreeding with man.[125] Josef Reichholf comments on this superiority of modern man compared to Neanderthals as follows:

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123 Wil Roebroecks/Paolo Villa, On the earliest evidence for habitual use of fire in Europe, PNAS, March 29, 2011, vol. 108, no. 13, pp. 5209–5214.

124 Steven Mithen, The prehistory of the mind, London 1996, pp. 8 and 11.

125 Gisela Grupe et. al., Anthropologie, Heidelberg 2012, p. 47f.

"His crucial advantage was the capability of speech. This was what enabled him to outmatch the Neanderthals who are assumed to have been capable of nothing but guttural sounds or primitive stammering … in the case of man, communication enabled a much more effective collaboration and a cohesion that was unprecedented."[126]

Other authors have a less romantic and more realistic view of the disappearance of the Neanderthals:

"This species was driven out, or rather stamped out, by the invasive hordes of Homo sapiens."[127]

At about 50,000 BP, the much-invoked "explosion of culture" in Homo sapiens occurred, which would indeed chronologically correspond to the period between 90,000 and 50,000 BP where language is assumed to have emerged. The appearance of wall drawings, ornaments, burial rituals and shamanism is indicative not only of much more intensive social interactions, linguistic exchange and more complex abstract thinking but also of the presence of a reflexive consciousness of self, of subjects who thought about their situation in the world and shared their thoughts with others.

It should perhaps be noted at this point that there is a persistent scientific debate about whether the Neanderthals were capable of speech as we know it. As I see it, a comprehensive view of the evolution from early man to Homo erectus/heidelbergensis to the Neanderthals results in a very clear picture of a culture marked by visual-instrumental thinking and simple technical procedures and strategies but extremely limited in its cultural, artistic and ritual behavior. This strongly suggests a life without developed language, that is, without the possibility of abstract intellectual exchange beyond what could be conveyed by facial expression and sign language. In this intensive debate about the first appearance of language the evidence, based on cutting-edge genetic methods, anatomical models and computer-based age determination, is consistently narrowed down to a time span between 90,000 and 50,000 BP, with strong arguments in favor of a relatively sudden appearance of language around 50,000 BP.

The evolutionary biologist Josef Reichholf notes:

"*The Neanderthals lacked a trait that we take for granted today, and which perhaps was the one that sealed their fate. This was the absence of language. The structure of the Neanderthal's larynx … did not allow for language in our understanding of the term. Therefore, there was no possibility for these ice age men to rely on a more extensive exchange of information to enable them to cope with the new difficulties they faced. This is a highly critical point that needs to be examined with great care. Are the skull finds really sufficient for us to be so sure that the Neanderthals had no real language? New findings from the late Neanderthal period suggest at least the possibility*

[126] Josef Reichholf, Das Rätsel der Menschwerdung, München 2011, p. 258f.
[127] Ulrich Kutschera, Evolutionsbiologie, Stuttgart 2015, p. 229.

*that there was a limited capability of speech. Significantly, these findings originate from the Africa-Near East transition region. At any rate, the Neanderthals could utter sounds, and it is impossible to estimate the extent of the corresponding exchange of information.*"[128]

Other authors are more cautious in this respect. Thus, Steven Mithen assumes that language existed since at least 250,000 BP, supposedly in terms of "social interaction." But what is at issue here is not social interaction or sign languages but a form of language like the one we *speak*. Mithen also addresses the anatomical bases of the Neanderthals capability of speech, relying on sources that favor the possibility that they were able to speak. In their book "How to think like a Neandertal," Thomas Wynn and Frederick Coolidge also are affirmative, if equally cautious, in their answer to the question. Essentially, their aim is to work out a number of characteristics of Neanderthal thinking (the genomes of modern humans and Neanderthals are 99,84 percent identical), two of which I would like to emphasize. Firstly, the greatest difference, as they see it, from modern man is the fact that for hundreds of thousands of years, no innovation can be attributed to the Neanderthals, perhaps with the one exception of fixing stone tips to spears. The authors describe Neanderthal thinking on the whole as very concrete, in the here and now, and in no way drawing on symbols. Secondly, they try to understand what the learning process may have been like in the case of tool manufacturing and suggest that it most likely consisted of observation and imitation, of "speechless instruction … bypassing the verbal step (and verbal thinking)," as in, for instance, a silent fencing lesson.[129] From my point of view, this is a clear indication that when it comes to concrete issues, these experts, too, offer the picture of a being with no, or only very rudimentary, speech capabilities. After all, it is obvious that if speechless instruction in and imitation of a technique is the mode of transmission there is no room for innovation or, inversely, that the lack of innovation of whatever kind suggests a society that has no language, or language only in a very rudimentary form. But notwithstanding this unclear situation, there are more concrete indications that support the thesis that the Neanderthals were not really capable of speech as we know it.

As it is, the anatomy of the human speech apparatus plays an important role in this context because besides the required cognitive capabilities, there are two other conditions that are crucial for the formation of speech sounds. Firstly, what is needed, along with the structure of the larynx, the whole innervation, the voice and respiratory musculature, is the hyoid bone. Secondly, one has to bear in mind that in the course of

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128 Josef Reichholf, Das Rätsel der Menschwerdung, München 2011, p. 219f.

129 Thomas Wynn, Frederick Coolidge, How to Think like a Neandertal, Oxford University Press, Oxford/New York 2012, pp. 41, 70.

evolution, the larynx descended: in early hominids just as in primates it is higher in the vocal tract while in adults today it is in the anterior neck. In newborn infants, the larynx is also still in the archaic higher position but descends during the first months. The hyoid, being a bone, can be found at excavations while the soft parts of the vocal apparatus of course decompose and can only be reconstructed, by computer animation, on the basis of the bone structure of the skull. The oldest known hyoid was found during excavations in Israel and is 60,000 years old. This find sparked an intense debate because the hyoid seems to have belonged to a Neanderthal skeleton.[130] From this, two considerations follow. Firstly, 60,000 years are consistent with the assumption that language arose relatively late, that is, around 50,000 BP. It is conceivable that even if this hyoid belonged to a Neanderthal, speech capabilities in late Neanderthals may have been more advanced than those of 200,000 years before, or that there had been interbreeding with humans. Essentially, however, the initial doubts concerning the speaking capabilities of the Neanderthals were rather based on the peculiar angle, in the Neanderthal skull, between the skull base and the vocal tract. This was quite stringently shown by Philip Lieberman in his detailed standard work "The Biology and Evolution of Language" (1984) where the anatomy, physics and acoustics of the vocal tract are analyzed over the course of human evolution. A particularly detailed analysis is dedicated to the Neanderthals' vocal tract, and the conclusion is as follows:

"*Despite these acrobatic maneuvers the reconstructed Neanderthal supralaryngeal vocal tract could not generate the formant frequency patterns of vowels like [a], [u], and [i] or the formant transitions that define the stop consonants [k] and [g]. The results of acoustic analyses of the cries of newborn human infants and the calls of nonhuman primates are consistent with this modeling study (George, 1978; Buhr, 1980; Stark, Rose, and McLagen.1975; Richman, 1976; Lieberman. 1980).*"[131]

So the vocal apparatus of the Neanderthals was phonetically more similar to that of primates and newborns. Lieberman further argues that if the Neanderthals had any language at all, it must have been very limited, and associates this state of affairs with their very limited culture. Here are the reasons why:

"*It is perhaps redundant to stress that I am not claiming that Neanderthal hominids lacked language and culture or could not reason because their phonetic ability differed from ours. The general theory for the biological bases of human language and their evolution that I have been discussing throughout this book argues against that. Nean-*

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130 B. Arensburg et al., A Middle Paleolithic Hyoid Bone, Nature 338, 1989, pp. 758–60.

131 Philip Lieberman, The Biology and Evolution of Language, Harvard University Press 1984, p. 318.

*derthal hominids would have had linguistic and cognitive abilities that are similar to ours if human language is built on neural mechanisms that structure the cognitive behavior of other species, plus a comparatively small number of species-specific mechanisms adapted to human speech. The genetic principle of mosaic evolution, in any case, argues against linguistic ability evolving as a complete system. Neanderthal hominids thus probably represent an interesting case of closely related hominids that had general cognitive and linguistic abilities similar to our more immediate ancestors but who lacked the special characteristics of human speech.*"[132]

The debate became even more interesting when a groundbreaking discovery was made in England in the 1990s: the identification of the function of the so-called FOXP2 gene, which was made in the context of the investigation of the genetic basis of a speech disorder found in an English-Pakistani family. Since then, FOXP2 has drawn much attention in linguistics and the philosophy of language as well as in evolutionary cognitive science while reception in philosophy has been scant (with the exception of Steven Pinker and Noam Chomsky). Perhaps the dominant analytic linguistic philosophy has a hunch that the discovery of FOXP2 does not bode well for it.

So, what is FOXP2 all about, and what could be its relevance for philosophy? FOXP2 is a transcription factor called Forkhead box protein P2 (FOXP2) that regulates a number of genes. FOXP2 can be ascertained even in the embryo and is the only gene, as far as we know today, that is responsible for the correct functioning of human speech. There already is quite a body of scientific literature on this issue, and the facts have been properly established and documented.[133] FOXP2 is also expressed in essential "junctions" of the brain and has a number of important functions: firstly, it regulates the fine motor activity of the motor-speech system and the jaw and neck muscles, with FOXP2 defects leading to motor speech disorders; secondly, it is involved in the formation of those innate brain pathways that are essential for speech; and, thirdly – and crucially in the present context -, a deficient FOXP2 gene results in a severe impairment of the syntax, that is, the grammatical structure of language. That is, individual words are understood but the syntactic functionality of language is severely impaired. From this it follows, firstly, that there is a genetically defined structure, developed in the course of evolution, that is responsible for the correct syntax, i.e. the grammatical-structural logic; and, secondly, that this essential gene has developed in the course of evolution and, as a

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132 Philip Lieberman, The Biology and Evolution of Language, Harvard University Press 1984, p. 322f.

133 Lai et al., A forkhead-domain gene is mutated in severe speech and language disorder. Nature 413, 2001, pp. 519–523. Konopka et.al., Human-specific transcriptional regulation of CNS development genes by FOXP2, Vol. 462; /nature 08549, Nov 2009. Martin Dominguez, Pasko Rakic, The importance of being human; Nature, Vol. 462, 2009, p. 169.

consequence, is innate just as universal grammar is. Since modern genetics could show that all humans worldwide stem from the same primordial genetic population in Africa, all humans also "took along" the same basic genetic endowment – the same faculties, as Kant would say – when they migrated from Africa to the other continents. "Barbaric" as it may seem from a perspective of philosophy, but without FOXP2, there would be no correct syntax, and without syntax, no correct logic of judgment!

Furthermore, a computer-based mutation analysis was conducted to specify the point in time when FOXP2 appeared in the evolutionary development of primates. The result was that the first appearance of FOXP2 in the human gene configuration must have occurred within a mathematical span of zero to two hundred thousand years, that is, on average, at about one hundred thousand years ago.[134] It should perhaps be noted that the mere presence of the FOXP2 gene does not imply that there was fully developed speech but only that the genetic basis for the cognitive control of the speech apparatus was by then sufficiently established to actually enable speech. Even though, according to the computation, the relevant mutation may in the extreme case have happened as early as 200,000 years ago, quite a long time was surely still needed for language proper to emerge. This also correlates very closely with the time span assumed by archeology and anthropology. Language as we know it apparently came rather late, at about 50,000 years BP. So since FOXP2-based grammar is obviously innate, Steven Pinker comes to the following conclusions:

"*The gene has counterparts in other mammals, but the exact sequence of the normal human version is unique to us, and it has been target of Darwinian natural selection during the past 200.000 years… Though no single gene specific to grammar has been identified (and perhaps none ever will), it is increasingly clear that sets of genes will be tied, with varying degrees of specificity and overlap with other functions, to aspects of language ability.*"[135]

Our capability of speech obviously rests on a mutation (or mutations) as well as on epigenetic developments that set in rather late – compared to the about three million years of hominid evolution – in the course of evolutionary humanization, that is, at about 100,000 years ago.

Whether language developed from facial expressions and sign language or from the existing ability to produce sound signals is the subject of ongoing discussions. Under the heading "Why language arrived late," Michael Corballis, for instance, argues:

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134 Wolfgang Enard et al., Molecular evolution of FOXP2, a gene involved in speech and language; Nature, Vol. 418, 2002, p. 869.

135 Steven Pinker, The Language Instinct, Harper Collins Publishers, New York 2007, P.S., p. 12.

"*One reason to believe that speech evolved late is that the vocal apparatus and the brain mechanisms controlling it had to undergo considerable change before speech was possible" … and goes on to conclude: "My surmise is that autonomous vocal language, with a largely non-essential visual component, may have arisen from a genetic mutation some time between 100.000 and 50.000 years ago in Africa… No doubt it was the development of syntax, perhaps in the context of gesture, that helped lift human culture to a level of complexity well beyond that of our primate forebears, and it may well have been the shift to autonomous speech that led to the cultural upheavals of 50.000 years ago."*[136]

On the whole, this would be consistent with the course of events I propose. Derek Bickerton quite rightly stresses another factor, namely the suddenness with which change occurred from early human culture, limited and rough, to Homo sapiens culture and its explosive development from about 50,000 BP onward:

"*Then suddenly, creativity blossomed. Somehow, there is a threshold effect. Somehow it has to be explained." He then goes on to say: "Until then, with all its problems (e.g. why Neanderthals, with bigger brains than ours, didn't win out against us), the best explanation is still that syntax as we know it developed in our species but in no other."*[137]

In conclusion, I would like refer to a recent 2007 article by Philip Lieberman that once more resumes all the neuro-anatomical facts, the FOXP2 debate included. This is an essential contribution because it includes comments by six important groups as well as Lieberman's final reply to all of them. All in all, none of the commentators had raised any general objections, and criticism or comments were technical or methodological in nature. Having summarized the knowledge on the issue of evolution gained in the last decades, Lieberman comes to the following conclusion:

"*The evolution of speech was driven by Darwinian natural selection, the opportunistic use of existing structures adapted for another purpose, and mutations on regulatory genes that had far-reaching consequences. Contemporary human speech and cognitive capabilities, including enhanced syntactic and lexical abilities, are species-specific properties of H. sapiens derived from anatomy and neural mechanisms that appear to have coevolved. The FOXP2 gene is clearly implicated in the formation of neural circuits that regulate human cognitive and motor capacities. Natural selection acting on the mutations that yielded its human form would have enabled rapid, encoded speech, in turn enhancing the selective value of the mutations that shaped the modern human vocal tract. These events, which led to the emergence of fully modern speech,*

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136 Michael Corballis, The Gestural Origins of Language. In: Christiansen/Simon Kirby (eds.), Language Evolution, Oxford University Press, Oxford/New York 2009, pp. 205 and 217.

137 Derek Bickerton, Symbol and Structure, In: Christiansen/Simon Kirby (eds.), Language Evolution, Oxford University Press, Oxford/New York 2009, p. 91f.

*language, and cognition, appear to have occurred sometime in the period between 90,000 and 50,000 BP…"*

After the question-and-answer part of the article Lieberman concludes as follows:

"*The time frames for the evolution of the human form of FOXP2 and that of speech anatomy are consistent with [Tattersall's] view that fully human language appeared after the appearance of hominids who resembled us in many respects. However, these archaic hominids did not have vocal tracts that could produce fully human speech. They also may have lacked fully modern human brains capable of freely reiterating speech motor commands, syntactic processes, and cognitive acts. I do not think that language provided the cultural stimulus that triggered human symbolic thought. Language and other symbolic behaviors appear to derive from the evolution of a complex interdependent neural substrate – one that was not present until 50,000 or so years ago.*"[138]

So based on genetic and anatomical studies, there is relatively strong agreement among experts today that the appearance of language in Homo sapiens was rather sudden, or at least very rapid, and should be dated at around 50,000 BP. If we start with Homo erectus or heidelbergensis who appeared at about one million to 800,000 years BP, this opens up a time window, decisive for my argumentation, of about 800,000 years, at a conservative estimate, during which early humans were *without language* but obviously capable of purposive-rational action. It follows that there must have been some form of successful, purposive-rational thinking that was grounded in *visual thinkin*g rather than language. The development of the cognitive modules and structures of the brain that are the basis of speech and the higher intellectual capabilities and functions builds on these innate faculties that had evolved over a very long time, just as the development of all the anatomical structures of the brain does. In all these brain centers, this modular development means that the "lower" and earlier functions are not replaced but complemented by the "higher" ones. In this sense, the appearance of language did not replace visual thinking, that is, the ability to "operate" visually (e.g. to rotate the mental representations of objects) and, based on this ability, to think visually. Both faculties complement each other situationally, which means that we have two complementary systems of thought, a visual one and a conceptual one.

**Conclusion Chapter 1:**
Let us now take stock, from a philosophical perspective, of current scientific knowledge:

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[138] Philip Lieberman, The Evolution of Human Speech, Current Anthropology, Vol. 48, No 1, Feb 2007, p. 52.

What is certain is that the first stone tools were manufactured about 2.6 million years ago and that the first deliberate use of fire was dated at 1.4 million years ago.[139] If language as we know it appeared as late as about 50,000 years BP, it clearly follows that for hundred thousands of years humans lived without language as we know it, but humans made weapons, went hunting, made as well as avoided traps, mastered fire, developed purposive-rational techniques, developed social behavior in groups.[140] So, focusing on what is philosophically relevant, the following statements can be taken to be logically consistent:

1. The oldest stone tools were made about 2.6 million years ago, which documents purposive-rational action (or at least its beginnings).[141]
2. More advanced techniques and tools such as stone axes and spears made of two or three components, well-weighted wooden spears and the mastering of fire are ascertained for the early human period at about 400,000 years ago. Early humans of this period (Homo erectus/Homo heidelbergensis; Neanderthals, partly subject to controversy) had no language as we know it, and their societies had the surprising simplicity and "lack of culture" that Steven Mithen describes as the greatest "puzzle" of this period. Communication consisted of visually communicated facial expressions and sign language and, arguably, a primitive proto-language of simple sounds.[142] Also, some sound and signal languages are assumed to have existed whose degree of abstraction, however, does not compare to that of modern languages.[143]
3. Language as we know it as well as human art and culture appeared at about 50,000 BP.
4. This clearly suggests a timeframe of about 800,000 years where all technical-instrumental activities, forms of communication, social interactions, problem solutions, inventions and practical achievements occurred and were passed on non-linguistically, or at least not by means of a structured, conceptual-syntactic language but by means of visual thinking and communication! Obviously, what this is about rather than mere seeing (with all the constitutive processing this involves, to be described below) or

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139 Richard Rudgley, The Lost Civilisations of the Stone Age, New York, 1999.

140 See the comprehensive collection of material by von Peter Watson, Ideen, München 2008, esp. the chapter "Vorsprachliche Ideen," pp. 57–83.

141 Chris Stringer, Peter Andrews: The complete world of human evolution, Thames & Hudson, 2012.

142 Derek Bickerton, Symbol and Structure, In: Christiansen/Simon Kirby (ed.), Language Evolution, Oxford University Press, Oxford/New York 2009, p. 92.

143 David Lewis-Williams, The Mind in the Cave, Thames & Hudson, 2002.

imagining, is visual thinking and problem solving, which implies the existence of purposive-rational action in its simplest forms, based on what I propose to call an understanding of function. The assumption, therefore, should be that at its earliest level, our thinking is visual and instrumental in its form and considerably older than any language but nevertheless sufficient for a number of practical purposes and logical enough to ensure early human life even under ice age conditions.

5. Today, it is assumed that language appeared relatively late and suddenly as the result of a mutation and that it evolved as a complement to existing, and enduringly successful, visual thinking. As suggested in the introduction, our language is indeed shot through with visual metaphors whenever thought processes are involved. Yet in our conscious discourse, visual thinking is a "hidden art in the depths of the human soul," and superseded by language. Our approach to this visual thinking is mostly retrograde, that is, with language as the medium since "non-linguistic" philosophizing is, of course, impossible. Still, it seems worthwhile to read philosophical texts against the grain, so to speak, that is, from the perspective of visual thinking, just as archaic cultures can be approached from the perspective of our civilization! I am fully aware that philosophers will instinctively refute this approach, given that philosophy is typically concerned with the exegesis of texts and that philosophical training has always been oriented to logos rather than eidos. Still, we should keep an open mind in this respect, for this mode of investigation, if completely unfamiliar, could turn out to be quite fruitful. It might show, on the one hand, that linguistic thinking is grounded in visual thinking, and help, on the other, to clarify possible confusions in epistemology as well as provide new insights that fill in some blank areas on the map of thinking.
6. Since Aristotle, our understanding of logic is linguistically grounded ("Now that which is is indeed spoken of in many ways" – Metaphysics, Book IV), for the Organon is concerned with a linguistic form of logic, a syllogistic logic.[144] However, as argued above, the latter must be based on a much older, innate visual-instrumental logic. Thus, we use an oxymoron such as a "wooden iron" or the "squaring of the circle" if we want to make it incontrovertibly clear that something is impossible. This raises the question of how this visual thinking is structured and how it can be described, for instance in terms of the Kantian concepts

[144] Aristotle, The Metaphysics, Penguin Classics 2004, p. 80.

of intuition, imagination, representation and schema. For in Kant, thinking is conceptual only and proceeds from judgment, and the categories are deduced from the forms of judgment. In the case of visual thinking, however, this procedure obviously raises some problems. Here, a possible way suggests itself in terms of the concept of function that was developed by Ernst Cassirer. Starting out from this concept of function, we can reconstruct an understanding of function, that is, a visual-functional core of a functional context that can be transformed into a concept, as for instance in the case of a lever and its function.

7. Language is linked to the FOXP2 gene, and whenever this genetically defined structure comes with inherited deficiencies, linguistic logic is impaired as a result. If the pre-formed structure for syntax is not adequately developed, language simply cannot be learned empirically or by training. Language as we understand it, and the logical-grammatical structures that are indispensable for understanding language, are a result of evolutionary development and, therefore, innate. They cannot be acquired by "experience," as empiricism would have it, nor drill ("Abrichtung," Wittgenstein) nor inculcation or "training on the part of society" (Quine). This is consistent with the position of Noam Chomsky who, in his Cartesian Linguistics,[145] posits a universal grammar that is innate and a priori underlies all languages. By analogy, Richard Gregory subsequently proposed a "grammar of vision" (see below, in the chapter on vision science), the basic structure of which largely corresponds to the forms of the grammar of language. This in turn suggests an underlying connection, a "common root" for both "trunks," i.e. innate visual thinking (keyword: intuition) and innate universal grammar (keyword: concept). More on this later.
8. Evolutionary biological facts are gaining in importance, and their explanatory potential and logic can no longer be denied. This is why we should feel free to apply these views, in a cautious but unbiased manner, also to those elements of texts by Plato, Descartes and Kant where – children of their time – they were steeped in mythical or religious constraints, that is, the cultural consensus of their day. It is well known that in an effort to justify *a priori knowledge* these authors tended to rely, at crucial points, on explanations in terms of transmigration (Plato),[146] the om-

[145] Noam Chomsky, Cartesian Linguistics, New York/London: Harper & Row 1966.

[146] Platon, Meno, in Plato, Five Dialogues: Euthyphro, Apology, Crito, Meno, Phaedo, Indianapolis/Cambridge: Hackett Publishing Company 2002, 86 a–c.

nipotence of God (Descartes)[147] or the contingency of the agreement of our understanding with the things of nature (Kant)[148]. Today, a rationalistic Neo-Kantianism no longer needs this kind of justification because more and more faculties and more and more comprehensive forms of knowledge are being revealed as *innate*.

The next step is to reflect on and discuss the consequences and implications of this novel constellation, which gain in scope the more you think about them. At any rate, the intuitive evidence of the "natural light" (Descartes) that is crucial in both Descartes and gestalt theory and has consistently been refuted as non-verifiable by empiricism[149] is now verifiable in terms of evolutionary biology. Also, Kantian epistemology will need to be re-examined, for the rehabilitation of visual thinking and judging entails a parallel change in the role of the imagination, or schematism, between or, rather, along with intuition and concept: *figurative synthesis* is no longer the only factor to be taken into account, and figures are not only constructed in the pure imagination. Rather, simple functional contexts can be understood and appreciated and problems can be solved even before the concept "comes into action". But Kant's own explanations regarding the table of judgments, or categories, actually suggest that there is a place in his system for visual thinking. For he notes:

"*… that this table, which contains four classes of concepts of the understanding, can first be split into two divisions, the first of which is concerned with objects of intuition (pure as well as empirical), the second of which, however, is directed at the existence of these objects (either in relation to each other or to the understanding).*" (B 110)

A very simple *understanding of function* or *visual thinking* would therefore be sufficiently covered by the first division, or class, of categories that concern judgments on objects of intuition, while the second division would rather concern conceptual thinking, with the possibility of transitions, as suggested in the chapter on thinking without language in hearing-impaired people. Regarding the possible reason for this division of the table of categories, Kant briefly notes:

"*As one sees, the first class has no correlates, which are to be met with only in the second class. Yet this difference must have a ground in the nature of the understanding.*" (B 110)

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147 René Descartes, The Principles of Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, pp. 194ff.

148 Immanuel Kant, Critique of the Power of Judgment § 77, Cambridge University Press 2000, 5: 407–408 (p. 275f).

149 On this problem, see: Laurence Bonjour, In Defense of Pure Reason, Cambridge University Press, Cambridge 1998, pp. 131ff.

But he does not offer a further explanation. My thesis that the first class of categories refers to the *understanding of function* or *visual thinking* regarding objects while the second class (that of relation and modality) is too abstract and can only refer to the interrelations between them and to the understanding would, then, be quite plausible, and highly consistent with the division proposed by Kant. Perhaps relation should also be grouped with *visual thinking* because every object must of course also be thought in terms of relations, which would indeed be the case for visual thinking that goes beyond the understanding of function.

## 2. Rationalism versus Empiricism, Analytic philosophy, Naturalism (EAN)
## Reflections on the tone of the debate in a long-standing conflict

Contemporary philosophy is in a peculiar state. First came an intensive effort from many sides to destroy classical philosophy of reason and to ridicule and vilify reason-based and rationalistic philosophy as antiquated metaphysics. Then began the long decline of predominant empiricism from the euphoric phase of positivism to analytic linguistic philosophy, followed by a proliferation of more or less obscure and irrational post-analytic philosophemes and the veering of quite a number of disenchanted proponents of empiricism to "new" naturalism and realism, on the one hand, and the ultimate self-elimination of all philosophy in Paul Feyerabend's "*farewell to reason*" and "*anything goes*" on the other. Today's predominant academic philosophy is largely represented by analytic philosophy, a movement, according to the self-characterization of its proponents, that is united around a certain history and methodology, as Ansgar Beckermann and Peter Bieri note. In his day, Otto Neurath described the project of positivist philosophy in an – often-repeated – image as a ship already on the high seas that needed permanent overhauling without ever being dry-docked, dismantled and thoroughly reconsidered.[150] This image is appropriate insofar as there has been a never-ending series of attempts to rectify and repair the basic misconceptions and aporias of positivism, all of which, however, did nothing to improve the ship's seaworthiness. The more adequate metaphor for the state of positivism would seem to be that of a wreck improperly assembled from the very start, exposed to incessant tinkering, adrift on the open seas and never reaching the felicitous islands of reason. In "Prolegomena zur Wissenschaftstheorie," Kurt Walter Zeidler offers a thorough reexamination of the basic pathologies of positivism and logical empiricism, very stringently outlining the strategic

[150] Otto Neurath, Protokollsätze (Protocol statements). In: Erkenntnis, Vol. 3, 1932/33, p. 206 (Repr.: Cohen and Neurath 1983).

tensions between empiricist sensualism, on the one hand, and positivism's conventionalism and attempts at semantic salvage, on the other.[151]

From a history-of-philosophy point of view, however, the collective dream of a permanent work-in-progress has the benefit of preventing the ship from ever having to be mercifully sunk since there is always the hope and the inducement of yet another go, somehow somewhere, at overhauling. After Locke had been found to be inconsistent in so many ways, you could invoke Hume. When Hume was revealed as mistaken, you could speak of "old empiricism" and pay homage to positivism. When there was realization that positivism with all its protocol statements in all that unified language failed to live up to its promise, you proceeded to the philosophy of language. As soon as Wittgenstein's Tractatus logico-philosophicus was declared to be short-sighted and profoundly wrong even by its author, on you went to language games, then to the holism of Quine's scientific propositions, to Feyerabend's "anything goes" and, still later, to post-analytic philosophemes, only to end up doing a collective cartwheel toward new realism and naturalism. The almost grotesque figure of all these philosophical wrong tracks and endless loops of a philosophy that is bent on exorcising the intellect and grows around awesome concepts such as emergence, intentionality, qualia or supervenience, with brains in tanks, Chinese rooms[152] and worlds where water is XYZ rather than H2O; absurdities that even EAN philosopher John Searle could not fail to notice. He speaks of "ever more frenzied efforts to stick with the materialist thesis," driven by a panic-stricken fear of Cartesian dualism:

"*After a few years of desperate maneuvers to account for the difficulties, some new development is put forward that allegedly solves the difficulties, but then we find that it encounters new difficulties, only the new difficulties are not so new – they are rally the same old difficulties.*"[153]

At the end, there is a "rediscovery of the mind" and a relaunch of the process of delusions rather than a turn to the much more intelligent – if

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151 Kurt Walter Zeidler, Prolegomena zur Wissenschaftstheorie, Königshausen & Neu-mann, Würzburg 2000.

152 See, for instance: Jaegwon Kim, Philosophy of Mind, Westview Press, Boulder, Col. 1996; Ansgar Beckermann, Analytische Einführung in die Philosophie des Geistes, Berlin 1999; Peter Bieri, Analytische Philosophie des Geistes, Königstein 1997; David M. Armstrong, The Mind-Body Problem: An opinionated introduction, Westview Press Boulder 1999; Hilary Putnam, Representation and Reality. Cambridge, Mass.: MIT Press 1988; E.J. Lowe, An introduction to the philosophy of mind, Cambridge University Press, Cambridge 2000; John R. Searle, Minds, Brains, and Science, London 1984.

153 John R. Searle, The Rediscovery of the Mind, Massachusetts Institute of Technology 1992, pp. 30

adjusted for some historical inconsistencies – systems of Descartes, Kant or Hegel.

Clarification of arguments is preferably done by formulaic letter-based equations as if making oneself understood by the very language that, after all, is supposed to be the sacred medium of analytic linguistic philosophy was impossible! External criticism bounces off by default because whatever happens to be falsified is always explained as belonging to some previous phase of the "overhauling" of the EAN ship and can, thus, be dismissed as obsolete and no longer relevant. Very rarely we find the self-critical reflection that a too one-sided emphasis on "sense experience" and the doctrine of "tabula rasa," that is, the mind as an initially blank slate or dark cabinet as it has invariable been conceived of since Lock and Hume and the dogma of empiricism, might simply be inadequate as a model for sufficiently explaining human cognition. An extreme, and more recent, example of these chameleon tactics is the work, already mentioned above, by Peter Carruthers, "Human Knowledge and Human Nature." In this book, quite explicitly written in defense of empiricism, Carruthers examines and discusses the issue of innate ideas and innate knowledge from every angle; and comes to the conclusion that the scientific evidence for the presence of epistemically relevant innate knowledge has become so strong, and the facts so irrefutable, that this fundamental rationalist thesis just can't be ignored any more. Now this is exactly what I think and, as I see it, simply one of the reasons why empiricism lost the war – Locke's "war"[154] – it had started against rationalism. But here we are in for a huge surprise, for Carruthers goes on to argue that the issue of innate knowledge had never been essential for empiricism at all and that the latter may very well proceed on its course as long as due note is taken of this innateness in a naturalist way.

Carruthers: "*Yet, opposition to nativism was never really an essential part of the empiricist enterprise. What was crucial was rather opposition to belief-acquisition processes whose reliability cannot begin to be accounted for in natural terms.*"[155]

This, of course, is unbelievable given that all of Book One of John Locke's "Essay Concerning Human Understanding" is well known for being nothing but a furious attack[156] on the approach of "innate ideas" proposed by Descartes and the Cambridge Platonists. So, for centuries and in many thousands of books and other writings, rationalists have been treated as fantasists, metaphysicians and hopeless dreamers while the possibility of innate knowledge has been militantly refuted, but when the

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154 Alexander Campbell Fraser, Locke, Edinburgh (1890) 2012, p. 116.

155 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 192.

156 Richard I. Aaron, John Locke, Clarendon Press, Oxford 1965, p. 83.

scientific facts have become irrefutable and more and more capabilities and knowledge are being revealed as innate, Carruthers just makes a U-turn as if nothing had happened. The country is bankrupt, the king is checkmate, the doctrine is dead, but you simply assert that in actual fact, this has never been about innate knowledge at all and that all the attacks on rationalism have just happened en passant and have never been that important, in the first place! Moreover, in an aside, Carruthers also discretely dumps empiricism's second basic criterion, too, i.e. "sense experience"; but more on this later.

In addition, we now understand the reason behind the breakaway from empiricism to naturalism. For when it becomes apparent that the "war" about innate ideas is lost, it is of course a smart, if desperate, tactic to switch to a naturalistic approach and define innate principles as an automatic input from innate natural structures, incorporating them into the basic empiricist dogma and, thus, making all cognition now stem, if not from sense experiences, at least from naturally structured sources. Nevertheless, one can't help feeling that even this recent desperate stratagem deployed by empiricism, will only prolong its suffering, since now there is only one fundamental dogma of empiricism left for naturalism to rely on, namely that all knowledge stems, or is at least deducible, from *sense experience* only. But the fundamental sensualist dogma of empiricism has become untenable not only because of the facts about innate knowledge. It is also dying, and even more rapidly so, because of the scientific insights of the theory of perception, i.e. *vision science*. Carruthers seems to have overlooked one important implication, however: if you admit that there is innate knowledge, and all the more so if you do it as sweepingly as Carruthers does, it logically follows that whenever we use this innate knowledge it cannot but automatically lead to synthetic a priori judgments because now there is synthesizing, i.e. connecting, thinking where previously there was only a blank slate, or dark cabinet. And this, in terms of harmfulness, would be as devastating for the empiricist dogma of faith as an appearance of the devil in the church. Of course, an author such as Carruthers knows this, too, when he writes:

"*…I shall consider whether the essential concerns of empiricists can be characterized so as to be consistent with nativism. If they cannot, then empiricism should now be pronounced dead, given the strength of the nativist case.*"[157]

So if even a proven proponent of empiricism in a book openly declared to be written in a pro-empiricist vein suggests that empiricism might be pronounced dead – and, what is more, dead because of "the strength of the nativist case" (!) – then a definitely more modest tone has made its

[157] Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 127.

way into the debate, quite unlike empiricism's boastful demeanor of the last decades when rationalism was supposed to be useless rubbish, fit to be thrown into the dustbin of history. In contrast, there is no denying that rationalism's criticism of empiricist theses and assumptions has always been harsh, it is true, but sober. On the part of empiricism, in comparison, a very arrogant and aggressive tone has prevailed in the debate especially since the early 20th century. This was the time when, according to the record of analytic philosophy, logic positivism and analytic philosophy began to take shape, drawing on the writings of Ernst Mach, the new conceptual logic of Gottlob Frege, the works of Bertrand Russell (especially the Principia Mathematica, written with Alfred N. Whitehead), the analysis-of-language studies of G.E. Moore and, finally, Wittgenstein's Tractatus logico-philosophicus.[158] What had previously been a polarity of diametrically opposed philosophical views between rationalism and empiricism turned to open enmity in the positivism of the Vienna Circle in its short streak of delusions of grandeur and the hope to be at last able to make short shrift of idealist and rationalist thinkers: giants such as Hegel were completely ignored or denounced as totalitarian, Kant was caricatured as the pedantic and typically obscure German professor, with one or the other idea arguably still worth discussing. The positivistic-analytic philosophers have never been squeamish in their defamation of their declared foes. In their dealings with rationalism and idealism, the tone could at times be rather aggressive and destructive: "removing the… debris of millennia,"[159] "eradicating" and "destroying,"[160] "being-plague" ("Seins-

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158 See, for instance: Hans-Johann Glock, What is Analytic Philosophy, Cambridge University Press, Cambridge/New York, 2009; Scott Soames, Philosophical Analysis in the Twentieth Century, Princeton University Press, Princeton 2005; Aaron Preston, Analytic Philosophy: The History of an Illusion, London / New York 2010.

159 Otto Neurath, Wissenschaftliche Weltauffassung – der Wiener Kreis [The Scientific Conception of the World: The Vienna Circle], in Otto Neurath, Empiricism and Sociology, Dordrecht-Holland/Boston-U.S.A. 1973, p. 309: "The representatives of the scientific world-conception resolutely stand on the ground of simple human experience. They confidently approach the task of removing the metaphysical und theological debris of millennia."

160 Karl Popper, Objective Knowledge: An Evolutionary Approach (1972), Revised edition, Oxford University Press 1979, Preface: "I regard the commonsense theory of knowledge as a subjectivist blunder. This blunder has dominated Western philosophy. I have made an attempt to eradicate it, and to replace it by an objective theory of essentially conjectural knowledge." The Open Society and its Enemies, Princeton University Press 1945, p. 31: "I am, rather, bent on destroying what is in my opinion mischievous in this philosophy."

pest," i.e. the ontologist's malady),[161] "philosophical sickness,"[162] "metaphysical lumber,"[163] "demolishing metaphysics."[164] Even Peter Strawson whom one might expect to hold more Kant-friendly views condescendingly speaks of a "disastrous model" in his famous criticism of Kant's transcendental analytic.[165] In the Anglo-American language area, the prejudice against rationalism is virtually the rule. John Cottingham, for instance, writes:

"*It is probably fair to say that the average 'intelligent layman', particularly in the English-speaking world, has, whether consciously or subconsciously, absorbed a strongly empiricist outlook concerning human knowledge; and this is particularly true when it comes to natural science.*"[166]

Rationalism's perhaps more subtle and, after all, more consistent views were also to some extent silenced by the steamroller violence of the empiricist-positivist publications machine and, thus, doomed to a niche existence, a common fate whenever a dogma rules. In the Anglo-American language area, well-argued and fact-based critical works on empiricism and positivism are often not known at all, and are simply out of stock even in the German-speaking area. Cases in point are the critical book by Alfred Klemmt: "John Locke," actually a comprehensive exposure of Locke's numerous inconsistencies but hardly to be found anymore;[167] "Erfahrung und Struktur" by Friedrich Kambartel;[168] "Erfahrung, Begründung und Reflexion" by Herbert Schnädelbach;[169] or "Der Aufbau des philosophischen Wissens nach Descartes" by Detlef Mahnke, which I believe is

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161 Wolfgang Stegmüller, Main Currents in Contemporary German, British, and American Philosophy, Dordrecht-Holland: D. Reidel Publishing Company 1969, p. 53.

162 Gottlob Frege, Posthumous Writings, Oxford: Basil Blackwell 1979, p. 105.

163 Bertrand Russell, Our Knowledge of the External World as a Field for Scientific Method in Philosophy [1914], Routledge 2005, p. 51.

164 Alfred J. Ayer, Language, Truth & Logic, Dover Publications 1946, p. 48.

165 Peter Strawson, The Bounds of Sense, An essay on Kant's Critique of Pure Reason, Routledge, London/New York 2007, p. 21. This standard work, highly praised and treated with reverence in the Anglo-American language area, is a valuable contribution because it addresses issues that are often raised by new students in the German language area and tries to explicate them at their level.

166 John Cottingham, Rationalism, Paladin Books, London 1984, p. 7.

167 Alfred Klemmt, John Locke, Meisenheim/Glan 1952.

168 Friedrich Kambartel, Erfahrung und Struktur – Bausteine zu einer Kritik des Empirismus und Formalismus, Frankfurt/Main 1968.

169 Herbert Schnädelbach, Erfahrung, Begründung und Reflexion, Frankfurt/Main 1971.

one of the best presentations of Descartes' way of thinking in the Regulae.[170]

In a similar vein, Noam Chomsky complained that he was "unable to locate a single copy, in the United States, of the […] Port-Royal Grammar."[171] The dogma of analytic philosophy rules – this is meanwhile true even for the German-speaking area, and not only at the universities where Kant and Hegel are after all still taught, if confined in a philosophy-of-language straitjacket, but also in the majority of articles found on the Internet. Even David Hume had already demanded that all books whose content was not exclusively based on numbers or facts be "committed to the flames."[172] In his book Language, Truth & Logic, Alfred J. Ayer, something like a "grand inquisitor" of the empiricist dogma along with Gilbert Ryle, explicitly refers to this Humean dictum that obviously seems to be in keeping with his own ideas.[173] In contrast, Descartes, so demonized today, arranged for his friend Mersenne to provide the elite of his supposed critics (such as, for instance, Hobbes or Gassendi) as well as some critical theologians with the text of his Meditations (a step planned long before he had finished writing them, see his letter to Mersenne of 13 November, 1639) and subsequently included their objections, along with his replies and clarifications, in the second edition of his work. This is showing strength: *rationalism* can afford this practice, it has the more sustainable arguments and is oriented to open dialogue rather than dogma-ruled suppression or the burning of books. Descartes would never have suggested or permitted that his opponents' writings be burned or indexed but would have mocked their narrow views with subtle irony.

On closer examination, the proponents of Empiricism-Analytic Philosophy-Naturalism (EAN) have increasingly come to realize that since their grandiose beginnings, each and every of their attempts to justify the basic criteria posited by them has failed. More particularly, no verification could be provided for sensual perception as the exclusive given basis for experience. Today, even well-intentioned authors such as Peter Baumann note:

"*In summary, we can say that what empiricism proposes as a basis for our knowledge is neither broad and sustainable enough nor is it pure … There seems to be little hope of empirically grounding a philosophical position such as empiricism … Faced with the choice of abandoning either our claims to knowledge or a theory such as empiri-*

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170 Detlef Mahnke, Der Aufbau des philosophischen Wissens nach Descartes, München/Salzburg 1967.

171 Noam Chomsky, Language and Mind. Enlarged Edition, Harcourt Brace Jovanovich 1972, p. 16.

172 David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, p. 161.

173 Alfred J. Ayer, Language, Truth & Logic, Dover Publications 1946, p. 54.

*cism, which is anything but presuppositionless, the latter option would rather seem to suggest itself.*"[174]

Prior to this, Noam Chomsky had already soberly stated:

"*In particular, the empiricist assumptions that have dominated the study of acquisition of knowledge for many years seem to me to have been adopted quite without warrant and to have no special status among the many possibilities that one might imagine as to how the mind functions.*"[175]

Descartes "bashing" is pursued with particular energy since he is perceived as the founder of modern rationalism, that is, of the basic idea that all humans potentially have the same *innate* rational "basic endowment" (the *natural light*), a fact that enables them to be self-conscious and self-responsible individuals and to live a life guided by reason, produce solid science, establish a reason-based, just and free society and master the processes of nature for the good of humanity. The American philosopher Harry M. Bracken gives a succinct outline of this phenomenon:

"*Although Descartes is often called the 'father of modern philosophy,' he has been attacked, reviled, and condemned like no other thinker for most of the last 350 years. Even Pope John Paul II has recently felt the need to criticize him. Refutations continue to pile up. European philosophy is haunted by Descartes and his ideas. One of his most important ideas is his rationalism, that is, that the human mind makes a major contribution to knowledge by means of innate ideas. The mind is understood to be structured by a range of principles which are not derived from sense experience … Rationalism is usually taken to stand in Opposition to empiricism, the view that all our knowledge is derived from sense experience. Empiricism generates a very different theory of human nature. These two different doctrines about human nature generate considerable controversy, much of it both fierce and bitter.*"[176]

Dominik Perler, one of the few authors from the ranks of analytic philosophy who, as I see it, interprets Descartes critically but always in a fair manner and in accord with his guiding principles, notes that the persecution of Descartes by the church and the state started soon after his death and "*that in 1663, the church authorities declared Descartes' doctrine to be heretic and placed his writings on the Index of Prohibited Books. This interdiction by the church was doubled by state sanctions. (…) In 1671, the teaching of Cartesian doctrines at the University of Paris was prohibited by royal decree.*"[177]

While Descartes was seen in a mostly positive light and as the founder of modern philosophy by German idealism, especially by Hegel and, to a

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174 Peter Baumann, Erkenntnistheorie, Stuttgart 2006, p. 244.

175 Noam Chomsky, Language and Mind. Enlarged Edition, Harcourt Brace Jovanovich 1972, p. 80.

176 Harry M. Bracken, Descartes, Oxford 2002, p. 1.

177 Dominik Perler, René Descartes, München 2006, p. 250f.

somewhat lesser degree, by Kant, his rejection by positivism and, in particular, early analytic philosophy was especially hostile. Descartes' works (along with Kant's "Critique of Pure Reason") were placed on the Index Librorum Prohibitorum, the Index of Prohibited Books, of the Catholic Church, but also on the "index" of despicable books of analytic philosophy. Dominik Perler gives some telltale examples:

"*J. Searle, for instance, argued that Cartesian dualism 'has such a sordid history that we are reluctant to concede anything that might smack of Cartesianism.' (Searle 1992, 13) … The negative image of Descartes proposed by G. Ryle in his influential book The Concept of Mind (1949) turned out to be especially devastating. According to Ryle, we will never come to a correct idea of the mind unless we steer clear of the 'Cartesian myth'. … Recent research, it is true, has repeatedly revealed Ryle's image of Descartes as a caricature; on closer examination, the alleged 'Cartesian myth' turns out to be a historiographical myth." … "An adequate idea of the mind, it is occasionally claimed (e.g. Kenny[178]), can only be an anti-Cartesian idea.*"[179]

In his book "Consciousness Explained" D. C. Dennett, a follower of Ryle's, speaks of an alleged "Cartesian theater," suggesting that Descartes had in mind something like an interior screen and an interior spectator viewing the pictures on it. Whoever is familiar, be it ever so superficially, with Descartes' writings and his example of the two ideas of the sun, one from visual perception and one from geometrical-astronomical calculations, will know that trivializations such as these are completely off the mark and that their author cannot have understood much about Descartes. Nevertheless, Zenon Pylyshyn readily seizes on the motive even though he does say that while nothing of this kind is explicitly mentioned in Descartes, it still is implicitly assumed (that is, in Dennett's distorted reading).[180] Thus, oversimplification and distortion serve to smuggle catchy notions such as "Cartesian theater" into the discourse, and other commentators, arguing that these notions can somehow, if not explicitly, be found in Descartes' writings, can then attribute ideas to him that are alien to his thinking. Dominik Perler again offers a very stringent and substantial rectification of the philosophical "defamation" in terms of "Cartesian theater" or "inner screen" or "arena" (Rorty) set up by Ryle and his followers:

"*Firstly, Descartes emphasizes that there is no relation of resemblance between the patterns of the brain (whether termed 'images' or 'figures') and the exterior object: '... we must at least observe that in no case does an image have to resemble the object it represents in all respects, for otherwise there would be no distinction between the*

178 Anthony Kenny, The Metaphysics of Mind, Oxford 1989.

179 Dominik Perler, René Descartes, München 2006, pp. 256–58.

180 Daniel C. Dennett, Consciousness Explained, Little Brown Boston 1991. Zenon Pylyshyn, Seeing and Visualizing, Bradford MIT Press, Cambridge / London 2006, p. 8.

*object and its image …'*[181] *If the alleged image in the brain were a representation of the perceived object there would have to be perfect correspondence between the image-object and the perceived object: each property of the image-object would have to have its exact counterpart in the perceived object…*"[182]

Perler quite rightly shows that, firstly, Descartes never speaks of a relation of one-to-one representation between object and mind. Here, Ryle's followers are taken in by their own dogmas, for they are the ones to secretly believe in the existence of some kind of immediate realism. But Perler then goes on to rectify the second, and much more crucial, point:

"*Secondly, Descartes points out that the brain is not at all something like an internal canvas with images being painted on it. If there were such images, there would have to be 'yet other eyes within our brain' with which to regard these images. This, however, is not the case. We only have the external eyes that are stimulated by the external objects (or, rather, by the rays of light that are reflected by the external objects) and transmit this stimulation to the brain. Here again: from the fact that there is a causal relation between the external object and a brain pattern it does by no means follow that there are images and something like an internal observer of these images in the brain.*"[183]

This argumentation calls to mind my earlier example of the finger tap on someone's shoulder: in one respect, it is a causal, if not one-dimensional, stimulus-response reaction, in another respect it is always also an interpretive act of the mind. And having thus shown that Descartes says exactly the opposite from what Dennett pretends he says, Perler addresses the third important point:

"*Thirdly, and finally, Descartes' explications in the Regulae clearly show that he does by no means understand the images in the brain to be pictures in the literal sense. (…) What is crucial here is that the figure for white is not white itself, nor does it resemble the color white in any way. Rather, it is something like a code for white, and for white only. For each perceivable property, there is a specific code. Thus, a figure or 'image' … is nothing but a complex code consisting of the codes for all the perceived individual properties of the object. Since every type of an object of perception has a specific combination of perceived properties, each type also has its specific complex code.*"[184]

Reading Descartes in the original soon makes it quite clear that he never conceives of the perception of an object in terms of immediate representation but invariably in terms of epistemological perception, and that on

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[181] René Descartes, Optics, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 165.

[182] Dominik Perler, Repräsentation bei Descartes, Frankfurt/Main 1996, p. 28.

[183] Cf. René Descartes, Optics, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 165.

[184] Dominik Perler, Repräsentation bei Descartes, Frankfurt/Main 1996, p. 29.

the contrary he refutes all theories of immediate representation. I have discussed the "Cartesian theater" or "arena" (Rorty) in some detail because I wanted to show and demonstrate how these deformations and distortions of Descartes' thought are still being quoted and, obviously, passed on by EAN even today. But Perler is not yet done with EAN. In a final turn he points out that, in truth, it is Gassendi and Hobbes, that is, ancestors of empiricism, who in their objections to Descartes' Meditations speak of pictures in the brain as the basis for cognition.[185] So actually, things are different in yet another way, for it is the EAN proponents themselves who are the originators of the "theater" or "gallery" in the brain that they try to attribute to Descartes although he always "vehemently" refuted this view.

This consistent "mobbing" has no doubt had its effect over time. Hans Poser has seen this very clearly:

"*Notwithstanding the groundbreaking achievement outlined above, notwithstanding the important problems that were addressed in their wake, Descartes often gets a bad press today – for the 350th anniversary of his death, virtually no tribute was paid to him in the German press, and the number of academic conferences was next to zero. Postmodern criticism has shown its effect: from Toulmin to Rorty – to mention only two prominent figures -, there is the accusation that Descartes is to blame for the absurd orientation of the sciences to truth and for having obscured our view for plurality. This accusation is underpinned by references to the history of science, but its postmodern resonance is due to a reference to relativity, uncertainty and undecidability.*"[186]

In a similar vein, Ivo Frenzel notes in a preface to Descartes' writings:

"*Anti-Cartesianism in philosophy has been more or less the rule in the last decades and has become particularly dominant in Germany. The protest of irrationalistic thinkers against Descartes, however, is quite in keeping with the tradition of German philosophy: Hamann, Herder, Nietzsche can be seen as typical figures in this respect … This attitude toward Descartes indeed makes one wonder." He is virtually "made responsible for the profanity of the modern world and, thus, for the original sin of modern thought.*"[187]

So while, on the one hand, Descartes was made a major enemy, along with Hegel, by late 20th-century irrationalism because of his rationalistic and rational stand, EAN philosophers have consistently branded him as religious, dualistic and idealistic, on the other. Given the large number of EAN chairholders and their strategy of mutual citations and confirma-

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185 Dominik Perler, Repräsentation bei Descartes, Frankfurt/Main 1996, p. 73, Third Set of Objections with the Author's Replies (in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, pp. 121–137).

186 Hans Poser, René Descartes, Stuttgart 2003, p. 165f.

187 Ivo Frenzel, René Descartes, Ausgewählte Schriften, Frankfurt/Main 1986, pp. 8, 9.

tions the anti-Cartesian and anti-rationalist anathema of Ryle, Rorty, Ayer, Kenny & Co. is today almost as effective as the Index of Prohibited Books of the Church was in its day. Albert

Reasons inherent in philosophy are not the only ones involved in this conflict between rationalism, on the one hand, and EAN, on the other. The heat and acrimony of the debate highlighted by Harry Bracken also has obvious ideological and sociopolitical roots, for the respective positions have far reaching consequences for basic ethical and sociopolitical attitudes and, not least, legislation. The rationalist will basically assume that our society should be grounded in that innate *reason* that is at least potentially available to and "equally distributed" (Descartes) among all humans or, in other words, can at least be "*recover[ed] … by himself, from within himself*" (Plato) by every human being. This implies that rationality should not only guide the conduct of science, for instance medicine, but also the construction of laws, the solving of conflicts and, along with justice, the organization of society as a whole. The rationalist will also assume that there will be ways to make conflicting parties "see reason"; and that these *reasonable rules* are knowable as well as communicable.

Typical arguments and reservations brandished by *empiricism* and *naturalism* against rationalism are:

- Refutation of *innate knowledge* and innate capabilities, or allegations of there being no evidence for innate knowledge, which, if consistently put forward, amounts to the same thing.
- Doubts about the possibility of *intuitive, rational insight*.
- Refutation of any stringent *necessity* in the thinking of mortal beings; and, following from all this:
- Strict refutation of *synthetic a priori* knowledge, that is, *universal and necessary knowledge* acquired on the basis of *a priori* (or *dispositional innate*) structures by means of sense data rather than exclusively stemming from sense experience.
- Refutation of *representative, mediated knowledge*, that is, of the insight that we cannot know the things of the exterior world "directly" and such as they are in themselves, but only such as they are represented and interpreted by our mind.

Empiricism holds that all knowledge is ultimately based on immediate *sense experiences* – "experience," as pointed out in the introduction, being a misleading term in this context; that in terms of epistemology there is no fixed-structure, necessary "reason"; and that ethical considerations, too, draw on experiences, each of which is considered an isolated occurrence, and on custom, sensation and "propensity," which implies that there are no unchanging guiding

principles.[188] This leads to the illusion that man can be freely formed and conditioned from scratch, a view that was programmatically developed in *behaviorism* as well as by Quine, who often speaks of inculcation or "training on the part of society," and by Wittgenstein in his discourse of "drill" ("Abrichtung"), as evident in the brutal corporal punishment he used on his less gifted pupils when he was a teacher.[189] In the heyday of positivism, great efforts were made to establish solid knowledge of the rules of language by the basic criteria of observation or by relying on conventions and rules extracted from mathematics. But all attempts made by positivism to establish this presuppositionless verification have failed.[190] In the 20th century, this failure of empiricism and positivism to establish, post hoc, its own presuppositions has ultimately prompted former proponents of empiricism to give in to the unlimited arbitrariness of *relativism* à la "anything goes" (Feyerabend)[191] and to Wittgenstein's language games. The result of all this is the peculiar mix of today's mainstream culture, made up of "anything goes," emotional judgments, relativism, irrationality.

### Rationalism and the world of concretely existing things

Another important point that needs considering in our account of the debate between rationalism and empiricism is empiricism's critique of idealism, or metaphysics, which in my view draws on a jumble of misinterpretations, flawed translations, shallow thinking, cultural biases and uncritical fellow travelers. In a seminar on Hegel that I used to attend when I was a student, one frequent co-attendant was a physicist who turned out to be a confirmed positivist. In an unforgettable scene during our collective reading of the first chapter of Hegel's *The Phenomenology of Spirit – Sense-Certainty*: *Or the 'This' and 'Meaning'* –, he started to hammer on the table before him with his index, shouting: "But we do speak about this table, don't we, this concrete table…!!" in a crescendo of hammering that made me fear for his finger. We Kantians and Hegelians in the seminar contemplated him with a mix of pity and embarrassment: he hadn't got it. He was the only one to not have grasped what Hegel wanted to convey: that in whatever way you relate to individual objects,

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188 See David Hume, A Treatise of Human Nature, Penguin Classics, Penguin Books 1985, Sect. V, Of the Effects of Custom.

189 Ray Monk, Ludwig Wittgenstein: The Duty of Genius, Vintage Books 1992, p. 195ff.

190 See, for instance, W.V.O. Quine, Two Dogmas of Empiricism (1953), in: A.P. Martinich (ed.), The Philosophy of Language, Oxford University Press, 2001, p. 57.

191 Paul Feyerabend, Science In a Free Society [1978], Verso Edition 1987, p. 39.

you always do it thinking, it is always mediated in the form of the universal that is inherent in you. Even the demonstrative "This" is universal, even your pointing with your finger is universal, and even the much-invoked "table" is integrated, qua concept, as a universal into the reflections of the mind. You are always in the medium of thinking, always in the medium of the universal. There is no such thing, for us, as a particular that is immediately given by sense experience, it is always mediated, mediated in the universal, in thinking. This is what Hegel, in a very clear, step-by-step demonstration, explicates and makes us realize in this first chapter on Sense-Certainty. So, whoever wants to understand it, can read it and understand it. Ernst Cassirer later formulated this typical "self-deception" of empiricism as follows:

"*One posits a concept of the given particular but fails to recognize that any such concept must always, explicitly or implicitly, encompass the defining attributes of some universal;…*"[192]

Anyway, the above-mentioned table is one of the most prominent pieces of furniture in analytic philosophy. Bertrand Russell, one of its founding fathers, liked to refer to his writing desk and, in turn, offered a groundbreaking suggestion with respect to analytic philosophy's widely-cited table:

"*If we press one eyeball, we shall see two tables; …*"[193]

So, there is much to learn from studying analytic philosophy, for instance about green neckties that look blue by daylight and about Jones to whom a tomato looks red,[194] a castle that is red,[195] a bottle that is blue,[196] and a blotting paper that is pink.[197]

Analytic philosophy arose – if we are to trust the "gospels" – as a movement specifically opposed to German idealism (in its English version) and with the declared intention of accomplishing a radical break with all the non-scientific, as they saw them, approaches of *idealism*. Bertrand Russell and G.E. Moore, in particular, are said to have rebelled

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192 Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 1, Language, New Haven & London: Yale University Press 1953, p. 110.

193 Bertrand Russell, Our knowledge of the External World As a Field for Scientific Method in Philosophy, (1914), Routledge 2005, p. 93.

194 Wilfried Sellars, Empiricism and the Philosophy of Mind, Harvard University Press 1997, pp. 28 and 38.

195 Ernst Tugendhat, Traditional and Analytical Philosophy: Lectures on the Philosophy of Language, Cambridge University Press 1982, p. 126ff.

196 Holger Leerhoff, Klaus Rehkämpfer, Thomas Wachtendorf, Analytische Philosophie, Darmstadt 2009, p. 43.

197 Ludwig Wittgenstein, Philosophical Investigations, London 1958, p. 212e, accessed: https://docs.google.com/file/d/0Bw-duXxYihdvWVlFaUhzclY5Vmc/view.

against Hegel's idealism as presented by F.H. Bradley, although if one is really familiar with Hegel, one can't help feeling that they cannot really have understood him or that, perhaps, they had received him in a thoroughly distorted reading. They charged idealist philosophers with denying the immediate reality of things and dreaming up an illusory mystical world that was diametrically opposed to common sense experience. Idealist logic, Russell argued, was such that it served an illusory mystical world:

"*Belief in the unreality of the world of sense arises with irresistible force in certain moods – moods which, I imagine, have some simple physiological basis, but are nonetheless powerfully persuasive. The conviction born of these moods is the source of most mysticism… It is in this way that logic has been pursued by those of the great philosophers who were mystics – notably Plato, Spinoza, and Hegel.*"[198]

In plain terms, Russell's charge is more or less as follows: some (politely speaking) great philosophers such as Plato, Spinoza and Hegel simply denied the immediate reality that every normal person experiences as concrete because they were either wrongheaded or stoned, confused mystics or confirmed lunatics whose deficiencies prompted them to spin out completely false, "malicious" logics. Pitted against this was sober empiricist thinking, exclusively based on sense experience and formal logic, scientific rigor and practical simplicity. Thus, Russell's and E. G. Moore's indignation essentially focuses on two issues that they inaccurately ascribe to idealism in their massive effort to mobilize against it: firstly, its alleged denial of the concretely existing world of things and, secondly, its overemphasis on and uncoupling of the non-sensory, the abstract, which by this very uncoupling from sense experience had resulted, they argued, in arbitrary fantasy constructions that they now felt called upon to demolish. This claim keeps turning up again and again, its function being to establish, by sheer repetition and like some "biblical Act of the Saints" for analytic philosophy (e.g. George E. Moore,[199] Alfred Ayer,[200] while Gilbert Ryle speaks of *Descartes' Myth* and the *Ghost in the Machine*[201]), an unquestionable starting point that, as such, needs to be refuted and recti-

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198 Bertrand Russell, Our knowledge of the External World As a Field for Scientific Method in Philosophy [1914], Routledge 2005, p. 55.

199 George E. Moore, The Refutation of Idealism, Mind, New Series, Vol. 12, No. 48 (Oct. 1903), pp. 433–453.

200 Alfred J. Ayer, Language, Truth & Logic, Dover Publications 1946, p. 45.

201 Gilbert Ryle, The Concept of Mind, Penguin Books Philosophy 1990, p. 17: "I shall often speak of it, with deliberate abusiveness, as 'the dogma of the Ghost in the Machine'." Why this should be a *dogma* escapes me since Descartes openly and in detail discusses the problem, invited other thinkers to express their reservations and would never have thought of "decapitating" (Ryle) those who thought otherwise, nor would he have "committed [books] to the flames" (Hume).

fied *ab ovo*. Strange as it may seem, this misrepresentation of idealist theories has unfortunately endured and is current even today.

But neither Plato nor Descartes, neither Kant nor Hegel ever denied the existence of a concrete external world of *things* (sometimes "*Sachen*" in Kant). Rather, what they all insist on is that there can be no one-to-one, godlike, unmediated understanding of things such as they are in themselves. Things cannot be known one-hundred percent, in a fully transparent, "direct" way and at any moment but must be appropriated, in accordance with the perceptual processes we are endowed with, by use of our understanding and our reason. Descartes discusses this problem in the sixth of his famous Meditations, where he reflects on "The existence of material things, and the real distinction between mind and body." Descartes' Meditations are a brilliant thought experiment that has never ceased to spur debates, analyses and controversies. Descartes himself, at any rate, recommended that we see it as such and for the rest rely on his more methodical writings such as "The Principles of Philosophy." Descartes' style in writing is very clear and readable, so anyone who is at all willing can understand what he intends to say. Regarding the composition of body and mind and their relation to the external world this is, word for word, what he writes:

"*For the proper purpose of the sensory perceptions given me by nature is simply to inform the mind of what is beneficial or harmful for the composite of which the mind is a part; and to this extent they are sufficiently clear and distinct. But I misuse them by treating them as reliable touchstones for immediate judgements about the essential nature* of the bodies located outside us*; yet this is an area where they provide only very obscure information.*"[202] (my emphases, WW)

Descartes starts out by saying that sensory perceptions are given to us by *nature* and that, therefore, they do not refer to a world of mystical illusions but concretely inform us, naturally and according to our natural capabilities, about the world around us. But then he writes, in no uncertain manner, that what is at stake here is an understanding of the nature of "*the bodies located outside us*" (even though the senses may at first "*provide only very obscure information*" on them). You can't be any clearer in referring to bodies that exist outside us! This is not about a mystical and misty external world but about the rational knowledge of concretely existing objects. It is true that these initial sensory perceptions are obscure at first, but this does not fundamentally prevent us from clarifying the initial picture! At any rate, they are "*sufficiently clear and distinct*" to enable us to know "*what is beneficial or harmful*" in everyday life and to engage in the process of cognition even though they are still "*obscure*" in

[202] René Descartes, Meditations on First Philosophy, 2nd ed., Cambridge University Press 2017, p. 66.

relation to the ultimate clarity of pure thought. The same is true for Immanuel Kant's *critical idealism* in, for instance, the "Prolegomena":

"*I say in opposition: There are things given to us as objects of our senses existing outside us, yet we know nothing of them as they may be in themselves, but are acquainted only with their appearances, that is, with the representations they produce in us because they affect our senses. … Can this be called idealism? It is the very opposite of it.*"[203]

At the beginning of the Transcendental Logic in the "Critique of Pure Reason," Kant already wrote:

"*Intuitions and concepts therefore constitute the elements of all our cognition, so that neither concepts without intuition corresponding to them in some way nor intuition without concepts can yield a cognition. Both are either pure or empirical. Empirical, if sensation (which presupposes the actual presence of the object) is contained therein; but pure if no sensation is mixed into the representation.*"[204]

Someone who expresses himself like this is thinking of concretely existing objects and a concretely existing world rather than phantasms, whatever analytic philosophy may insinuate. This is also confirmed by Erich Adickes' studies on Kant's *Opus postumum* as well as by his "Kant und das Ding an sich",[205] the latter being the point of reference for the following statement by Herbert Herring:

"*Thus, for the Kant of the 'Critique', the existence of a concrete external world is an undeniable fact that requires no philosophical proof.*"[206]

What Kant says is simply this: here we are in our consciousness, our spontaneous understanding, and there is what we commonly call the sun. Is it a disc, as our senses would tell us, perhaps three centimeters wide, yellow, sometimes a different color (light is actually pure white), which, moreover, is only the way it looked eight minutes ago before its visible rays reached us (which Russell also knew)? No. Do we know every eruption of the central body, at any moment? No! Do we know every molecule, atom, particle radiation of this ball of fire? No! Do we perceive every motion, fluctuation, change of track in outer space? No! What, then, do we really know about the sun? We know its changing appearance in the course of the day and the warmth that warms the stone, which is what we receive from our senses, but we use our understanding to organize and systematize the sense perceptions we receive, on the one hand, and in addition

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203 Immanuel Kant, Prolegomena to Any Future Metaphysics, Cambridge University Press 1997, 2004, p. 40.

204 Immanuel Kant, Critique of Pure Reason, Cambridge University Press, 1998, p. 193 (B 74).

205 Erich Adickes, Kant und das Ding an sich, Berlin 1924.

206 Herbert Herring, Das Problem der Affektion bei Kant, Kantstudien Ergänzungsheft 67, Köln 1953, p. 36.

employ our understanding and our instruments to carry out measurements and calculations that give us a more realistic idea than that received from our senses of what the sun might be, its function, its true size and its distance. But nobody, really nobody – aside from EAN proponents, of course – knows the sun such as it is in itself, down to the last atom, the last radiation, at any moment. And yet this does by no means imply that its actual existence is denied or mystified. On the contrary! The example of the sun was chosen on purpose, for Descartes already reflected on it so much earlier:

"*For example, there are two different ideas of the sun which I find within me. One of them, which is acquired as it were from the senses and which is a prime example of an idea which I reckon to come from an external source, makes the sun appear very small. The other idea is based on astronomical reasoning, that is, it is derived from certain notions which are innate in me (or else is constructed by me in some other way), and this idea shows the sun to be several times larger than the earth. Obviously both these ideas cannot resemble the sun which exists outside me; and reason persuades me that the idea which seems to have emanated most directly from the sun itself has in fact no resemblance to it at all.*"[207]

Descartes, too, does not doubt the existence of the sun ("*…the sun which exists outside me*"). Rather, what he is concerned with is the (transcendental) question of its representation, that is, the way we can know about it, the way it is present in our consciousness, and how we can have two different ideas, at the same time, of the same object: a pictorial, imagined one and an idea of function. For as soon as the understanding compares both ideas in terms of their "richness" it turns out that the empirical idea received from sense experience is actually less "true" than the idea of function that is acquired through thinking, i.e. astronomical-mathematical calculations. The idea received from sense experience is recognized as the "poorer truth", as Hegel would call it. Although G.E. Moore's polemic is explicitly leveled at Berkeley's subjective idealism rather than German idealism as such,[208] Russell's polemic always extends also to Kant and Hegel. But Hegel, too, never denied a concretely existing world of things, on the contrary: sense-certainty is the necessary and logical precondition without which the mind could not pursue its path toward self-determination. The difference, however, is that as soon as the immediately perceived, the particular, enters the realm of reflection and thinking it already has become a universal, and no amount of hammering on what seems to be an immediately perceived table can alter this fact. Rather, Hegel occasionally caricatures empiricism's and naturalism's naiveté:

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[207] René Descartes, Meditations on First Philosophy, 2nd ed., Cambridge University Press 2017, p. 32.

[208] G.E. Moore, The Refutation of Idealism, Mind, New Series, Vol. 12, No. 48 (Oct., 1903), pp. 433–453.

"*They mean 'this' bit of paper on which I am writing – or rather have written – 'this'; but what they mean is not what they say. If they actually wanted to say 'this' bit of paper which they mean, if they wanted to say it, then this is impossible, because the sensuous This that is meant cannot be reached by language, which belongs to consciousness, i.e. to that which is inherently universal.*"[209]

What the student hammering on the table fails to grasp and what Russell also seems to ignore is that Hegel does not deny the existence of the paper or the table. But the paper, the table, and every object in general is at the same time grasped as universal by the consciousness and, thus, conceptually transformed from the state of sense-certainty into the medium of knowledge, that is, the universal, the mind. That the concrete table, the concrete paper, is really there, in its place is not a problem for Hegel since subject and substance are anyway supposed to become identical! How could this process reach the desired outcome if "nothing existed[ed] in actuality"? Thus, in his Logic, Hegel stringently argues: "*whatever is, exists concretely.*"[210] In his "Encyclopedia of the Philosophical Sciences" Hegel even agrees with empiricism:

"*There lies in empiricism this great principle that what is true must exist in actuality and be there for perception.*"[211]

Let's note that, firstly, Hegel here actually appreciates empiricism as the lowest but essential level of cognition and, secondly, that what is true must exist in actuality and be there for perception! Would anyone seeking to put the case for a mystical nirvana speak like this? No! From the few passages quoted above, it should have become quite clear that none of these idealist philosophers – Descartes, Kant, Hegel – was a whacked-out mystic, under the influence of drugs, or simply a lunatic, as Russell suggests and EAN philosophers occasionally insinuate. On the contrary: all of them assumed a concretely existing world of things, albeit one that first needs to be apprehended in the process of cognition and is never simply, directly and immediately "given." Interestingly, and ironically, the only philosopher to question the existence of external reality is George Berkeley, that is, one of the Big Three of English empiricism, who does so in his system of subjectively idealism. So, when discussing the relevant aspects, Russell in part also criticizes Berkeley along with Hegel, although in his more general anti-idealist attacks Hegel is often the one to come under crossfire.

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209 Georg Wilhelm Friedrich Hegel, Phenomenology of Spirit, Oxford University Press 1977, p. 66.

210 Georg Wilhelm Friedrich Hegel, The Science of Logic, Section II, Chapter I, Cambridge University Press 2010, p. 420.

211 Georg Wilhelm Friedrich Hegel, *Encyclopedia of the Philosophical Sciences*, Cambridge University Press 2010, § 38, p. 79

There is another interesting historical connection here that should be kept in mind, namely that at the time of World War I and, then, World War II there was a strong anti-German resentment in Great Britain, partly targeting Kant, as well, but primarily directed against Hegel, that fostered solidarity with the English empiricism of Locke, Berkeley and Hume. There is a certain reluctance to dwell on this chapter, but given the 1930s and 1940s surge of reorientation toward British empiricism – led by Alfred Ayer and Gilbert Ryle rather than Russell and Moore – this is obvious even without a more in-depth recourse to the history of philosophy. In his detailed and precise study of "British Idealism," W.J. Mander describes the tensions that set in at about the time of World War I:

"*The anti-German feeling unleashed by the war – a reaction typified in Haldane's fall from political grace – led to a backlash against everything German. Unfortunately for it, the British Idealist philosophy was less able to hide its German ancestry than the British Monarchy, and so it too found itself under a cloud of xenophobic suspicion. Specifically its political philosophy came under attack, for it was seen to follow Hegel, and Hegel (the accusation went) was the chief inspiration behind Germany's recent militaristic and nationalistic stance, on which all blame for the war fell.*"

Mander then refers to J.H. Muirhead who in his 1915 lectures, and again in March 1939 in Oxford, took a stand against the heavily prejudiced condemnation of classical German philosophy:

"*The problem behind the current situation, he argues, is not that Hitler's Germany has absorbed too much Hegel, but that it has turned its back on him.*"[212]

The grotesque nature of these hostilities is evident already from the fact that neither rationalism nor idealism could ever have provided an ideal philosophical basis for National Socialism, quite on the contrary. There is not a single statement by Kant or Descartes that would have lent itself to this kind of misuse, in stark contrast to Nietzsche, Heidegger and even the subliminally racist attitudes of Locke and Hume![213] Rather, the NS regime's anti-Cartesian sentiment became quite pronounced as early as in the 1930s, as evident in writings such as "Anti-Cartesianismus: Deutsche Philosophie im Widerstand" by Franz Böhm (1938)[214] or in the increasing

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212 W.J. Mander, British Idealism, Oxford University Press, Oxford 2014, p. 554f.

213 See Harry M. Bracken, Descartes, Oneworld Oxford 2002, Chapter 10, pp. 119–127; e.g. David Hume: "I am apt to suspect the negroes, and in general all other species of men, (for there are four or five different kinds) to be naturally inferior to the whites." Essay: On national characters, Footnote, in: Essays Moral, Political, and Literary, ed. 1753/54; see also: Richard H. Popkin, The Third Force in Seventeenth-Century Thought, E.J. Brill, Leiden 1992, Chapter: Hume's Racism reconsidered, pp. 64–75.

214 Franz Böhm, Anti-Cartesianismus: Deutsche Philosophie im Widerstand, Leipzig 1938.

anti-Cartesian animosity displayed by Heidegger who blamed Descartes for having initiated the "decline of philosophy,"[215] among other things, while he himself had taken the side of the regime by joining the Nazi party (NSDAP) as early as in 1933. In his comprehensive account of Heidegger's "achievements" as a protagonist of the Nazi dictatorship, Emmanuel Faye also refers to the latter's militant repudiation of Descartes, quoting from Heidegger's 1933/34 university lectures where he explicitly states that German universities were reduced to "spiritual dissolution" because students had too strongly focused on "*Descartes … with his generalized doubt and at the same time his 'accent' placed on the I …*"[216]

Moreover, a great number of the leading neo-Kantian philosophers in 1930s Germany were Jewish and, thus, persecuted, displaced or murdered by National Socialism. Many German and Austrian thinkers emigrated to the Anglo-American language area, which resulted in a division among the intellectuals who, for the most part, were adherents of critical theory, phenomenology, positivism, neo-Marxism or Neo-Kantianism. Karl Popper is a typical case that illustrates this dramatic situation and yet, at the same time, his anti-idealism contributed to the deepening of this division. While neo-Kantian philosophers such as Ernst Cassirer, Richard Kroner, Siegfried Marck, Jonas Cohn or Richard Hönigswald could not really come into their own in exile, the proponents of positivism and the analytic linguistic philosophy found all doors open to them, cases in point being Wittgenstein and Carnap, among many others. After the War, and save for a few exceptions such as Herbert Marcuse, most of the neo-Marxist thinkers returned to Germany, most of them rallying around the Frankfurt School. Nevertheless, the anti-idealist, anti-rationalist (with Descartes as their major foe) and primarily anti-Hegelian sentiment endured, and it is only in recent decades that interest in Hegel has seen a revival also in the Anglo-American area and within analytic philosophy,[217] whereas

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[215] For a very instructive account of Heidegger's idiosyncratic opposition to Descartes and National Socialism's anti-Cartesianism, see Sidonie Kellerer, Zerissene Moderne, Descartes bei den Neukantianern, Husserl und Heidegger, Konstanz 2013, pp. 167–229.

[216] Emmanuel Faye, Heidegger: The introduction of Nazism into Philosophy in Light of the Unpublished Seminars of 1933–1935, Yale University Press 2009, p. 93; Faye quotes Martin Heidegger, GA 36/37 Sein und Wahrheit, 6, § 10 pp. 38–39, Hartmut Tietjen (ed.) 2001.

[217] See Stuart Barnett, Hegel after Derrida, Warwick Studies in European Philosophy, Routledge 1998; Wolfgang Welsch, Hegel und die Analytische Philosophie, Jenaer Universitätsreden 15, Jena 2005, pp. 145-221. Welsch refers to the following major recent studies on Hegel: Robert C. Solomon, In the Spirit of Hegel: A Study of G.W.F. Hegel's Phenomenology of the Spirit, New York: Oxford University Press 1983; Robert Pippin, Hegel's Idealism: The Satisfactions of Self-Consciousness, New York: Cambridge University Press 1989; Tom Rockmore, Hegel's Circular Epistemology, Bloomington: Indiana University Press 1986;

Descartes has primarily remained the "arch villain" and "scapegoat." For Neo-Kantianism that had marked the flourishing landscape of German-language universities between 1865 and 1918,[218] historical developments were especially deleterious because unlike the emergent Marxism it had no basis in either the state or the masses but primarily remained a university-based philosophy, perhaps with the exception of the neo-Kantian socialists. In the 1960s, EAN started to supersede the phenomenological residues from the times of Heidegger and the Nazis at the universities and, being politically desired, embarked on its triumphant advance. And so the perhaps most precious jewel of the German – and in a significant part also German-Jewish – spirit was marginalized and eliminated. It is simply absurd to connect this thinking even remotely to the NS regime, as arguably happened in England during the War.

Looking back, once more, on the beginnings of analytic philosophy, we find another "biblical legend" regarding the "proof" of the existence of the world of things in themselves, this one by "saint" G.E. Moore. That the existence of this world was never denied by rationalism and idealism, in the first place, has already been shown. But the solution offered by G.E. Moore is remarkable, at any rate. "Saint" Moore, or so the legend will have it, raised his hand before the crowd, pointed to it, then raised his other hand – and so the existence of the world of things in themselves was proven to the public that stood in awe in the hall, and all rejoiced and praised the Lord. Luckily, he had shown something that all those in the hall already knew, rather than projecting, for instance, a histological tissue section of the stomach or the bone marrow, seen through a microscope and showing a fair bit of colors, forms and structures that nobody in the hall would have immediately recognized. For recognizing a hand you already know is one thing, recognizing the variety of colors, forms and structures of a histological stomach specimen is something else altogether, since in the latter case you would at the same time have realized that what really makes you recognize the tissue section is an understanding of the *functions* of individual cells and tissues. Moore's demonstration perfectly illustrates empiricism's eternal mechanism of self-deception, i.e. their belief that they recognize what is already known, what they are "acquainted" with. Norwood E. Hanson has explored this recurrent EAN mecha-

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Tom Rockmore, Cognition: An Introduction to Hegel's Phenomenology of the Spirit, Berkeley: University of California Press 1997; Michael Hardimon, Hegel's Social Philosophy: The Project of Reconciliation, New York: Cambridge University Press 1994; Terry Pinkard, Hegel's Phenomenology: The Sociality of Reason, New York: Cambridge University Press 1994; Terry Pinkard, Hegel: A Biography, Cambridge: Cambridge University Press 2001; Michael Forster, Hegel's Idea of a Phenomenology of Spirit, Chicago: University of Chicago Press 1998.

[218] See Klaus Chr. Köhnke, Entstehung und Aufstieg des Neukantianismus, Frankfurt/Main 1993.

nism of self-delusion in his extremely readable book "Patterns of Discovery." In it, he describes two scientists who, starting out from different theories, look at cells through a microscope. Their theoretical approach determines "what they see":

"*Of course they see the same thing. They make the same observation since they begin from the same visual data. But they interpret what they see differently. They construe the evidence in different ways. … Both vision and knowledge are indispensable elements in seeing.*"[219]

As for me, I would even contest that they "see" the same thing, for just as an experienced hunter will recognize from the distance some animals standing out against the wood – something the layperson, relying on the same beam of light rays, simply can't do, can't "see" –, the two microbiologists will see different things in the microscope, depending on their level of training and experience, on top of the important difference addressed by Hanson in the above passage. This is why all the examples given in EAN literature rely on objects that are as simple as possible, with one attribution only, and *already known to everybody*. Hence the frequency of the "red ball," "the cat on the mat," the blue bottle, or the green necktie, since with objects such as these, attribution is simple and they themselves as well as their attributes are already known. All one has to do is to attach a nametag, and "cognition" is accomplished and ready to be encapsulated in a proposition: "this is a red ball" – big deal! Hermann Cohen stringently summed up the mechanism of self-delusion in empiricism, positivism and naturalism as follows:

"*That these concrete impressions never and nowhere present themselves in isolation but are from the beginning connected with concepts in our consciousness is an idea that is not duly considered. Concepts are derived from impressions after they have been implanted into them, full-fledged, by thinking. The sensualist seems to analyze, to take apart groups of representations, and to re-group the elements thus taken apart; in truth, however, all he does is connect full-fledged, fixed representations.*"[220] (my emphasis, WW)

In Anglo-American mainstream philosophy, Wilfried Sellars was one of the very few philosophers who dared to denounce the EAN "myth of the given." In his book "Empiricism and the philosophy of mind," he discusses the epoch in the wake of positivism and describes what he sees as their main flaw:

"*For they [the sense-datum philosophers, WW] have taken givenness to be a fact which presupposes no learning, no formation of associations, no setting up of stimulus-*

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219 Norwood E. Hanson, Patterns of Discovery, Cambridge University Press, Cambridge 1969, pp. 4 and 25.

220 Hermann Cohen, Kants Theorie der Erfahrung, Berlin 1885, p. 92.

*response connections. In short, they have tended to equate sensing sense contents with being conscious, as a person who has been hit on the head is not conscious whereas a new born babe, alive and kicking, is conscious.*"[221]

Even though the argument is put forward in an somewhat awkward manner, we still see that one of the basic errors of the "sense-datum philosophers" has been understood. With the cells under the microscope, to return to Hanson's example, this simple EAN mechanism of self-deception no longer operates because while objects are indeed perceived in the field of vision, their *function* is not recognized since it is not yet understood. Thomas Kuhn has made it particularly clear that observing and "seeing" scientific phenomena is always dependent on a person's background theories and paradigms and that there is no such thing as objective, theory-independent observation:

"*Led by a new paradigm, scientists develop new instruments and look in new places. Even more important, during revolutions scientists see new and different things when looking with familiar instruments in places they have looked before. It is as if the professional community had been suddenly transported to another planet where familiar objects are seen in a different light and are joined by unfamiliar ones as well. Of course, nothing of quite that sort does occur: there is no geographical transplantation; outside the laboratory everyday affairs usually continue as before. Nevertheless, paradigm changes do cause scientists to see the world of their research-engagement differently.*"[222]

Interestingly, Bertrand Russell himself occasionally defended views that were peculiar even from an EAN perspective. Thus he writes:

"*The real table, if there is one, is not immediately known to us at all, but must be an inference from what is immediately known.*" *And, somewhat further below: "In one sense, it must be admitted that we can never prove the existence of things other than ourselves and our experiences.*"[223]

So Russell himself now questions the existence of the table! Also, there is his book "Mysticism and Logic" that is hard to bring in line with his general way of thinking. This leads to a highly interesting aspect that would go beyond the scope of this book, namely the frequent lapse of positivist thinkers into forms of mysticism, a biographical trend found in Auguste Comte, Ludwig Wittgenstein, Alfred North Whitehead, Paul Feyerabend, Fritjof Capra, Ernst Tugendhat, and a number of others. Remarkably enough, later in life, many EAN exponents developed a sudden penchant

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221 Wilfried Sellars, Empiricism and the Philosophy of Mind, Harvard University Press 1997, p. 20.

222 Thomas S. Kuhn, The Structure of Scientific Revolutions, The University of Chicago Press (1962) 1996, p. 111.

223 Bertrand Russell, The Problems of Philosophy (1912), Seven Pleasures Publications 2009, pp. 10 and 17.

for mystical philosophemes. One gets the impression that the one-dimensional orientation to sense-experience combined with unproductive language games and the simultaneous denial of rational insight, the ego, and the reason-based unity of cognition may at a certain point give rise to feelings of emptiness or arbitrariness where positivism and "anything goes" may veer into mystical philosophemes. So although the proponents of EAN themselves occasionally lapse into mysticism, they never tire of denouncing idealist philosophes as unworldly mystics or, at least, of dishing out small verbal lashings in this respect in their writings, in a kind of standard ritual of the analytic "movement" with Descartes and Hegel as their most frequent targets.[224] But EAN proponents also have bright moments and moments of sudden insight. Thus "apostle" Bertrand Russell, having more or less successfully grappled with numerous problems pertaining to the history of philosophy, concedes:

"*It must be admitted, for the reasons already stated, that logical principles are known to us, and cannot be themselves proved by experience. In this, therefore, which was the most important point in the controversy, the rationalists were in the right.*"[225]

## The role of Platonism in EAN

Let's now proceed to another EAN peculiarity, namely the fact that its doctrine manages to both integrate a crude "Platonism" in some of their doctrines and systematically vilify or ridicule Plato's *genuine idealism* and *nativism* at the same time. In the rationalist tradition, in contrast, Plato has rightly been understood as the founder not only of occidental philosophy but, more specifically, of *idealism* and *rationalism*. Cottingham notes:

"*Indeed, Plato's account of the nature and objects of true philosophical knowledge was so influential that he can in many respects be called the father of rationalism.*"[226]

He was the first to state, reason out, argue step-by step and systematize the key ideas of rationalism. Its essential and well-known aspects are, in short: universal and necessary knowledge is gained by *insight* of the mind, by seeing with "the eyes of the mind," rather than received from the senses that may always deceive us. Certain knowledge can be acquired by follow-

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224 Typical cases can be found in Ernst Tugendhat, Traditional and Analytical Philosophy: Lectures on the Philosophy of Language, Cambridge University Press 1982, p. 278; or Bertrand Russell, The Problems of Philosophy (1912), Seven Pleasures Publications 2009, p. 97f.; and many others.

225 Bertrand Russell, The Problems of Philosophy (1912), Seven Pleasures Publications 2009, p. 51.

226 John Cottingham, Rationalism, Paladin Books, London 1984, p. 13.

ing the guideline of *ideas* that are conceived of as atemporal and immutably true principles or models, such as a perfect circle. Insight is gained by applying the innate forms of knowledge (whose origin is grounded in myth by Plato because, obviously, the theory of evolution was not known to him at the time) and by a dialectical, hypothesis-guided upward progression from experience, in itself incapable of providing true knowledge, to these perfect ideas. According to Plato, certain knowledge is necessarily constituted a priori, that is, *prior to any sense experience*, for what is logical and immutable cannot be received from sense experience because the latter is, by its very nature, constantly changing and never perfect. "*Such knowledge is not a posteriori, not derived from experience but a priori, derived from abstract reasoning independently of the senses.*"[227]

Now, in the field of mathematics, another "Platonist" current has developed in parallel to Plato's seminal philosophical doctrine that, as mentioned above, has had such a fundamental and fruitful influence on rationalism. This other current is not really in accordance with the idealistic reading of Plato but has become the starting point for EAN's peculiar "Platonism". To give a rough idea of (mathematical) Platonism, here are four essential theses as listed by James Robert Brown:

1. Mathematical objects exist independently of us;
2. Mathematical objects are abstract; they exist outside of space and time.
3. We learn about mathematical objects as a result of the mind's ability to somehow grasp (at least some of) them.
4. Though it is apriori (i.e. independent of the physical senses), the mathematical learning process is not infallible.[228]

This clearly states that the logical figures of mathematics and geometry are supposed to exist independently of us and *outside of space and time* and are, at the same time, abstract. We experience them because the mind is capable of somehow "grasping" them. Now this is very vague, of course, and this "grasping" in particular has drawn much criticism from EAN. We are obviously confronted with a dilemma that has implications not only for the mathematical-geometrical debate but also for philosophy in general. It arises from the fact that logical insight must obviously be true universally and with necessity; which means that $2 + 2 = 4$ is always true as well as concretely correct when using one's fingers to do the operation. But it cannot be derived from sense experience, as has been clearly shown not least by Frege with respect to J.S. Mills' ambitious but ultimately inconsistent efforts in this respect. As a consequence, all that's left to do

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227 John Cottingham, Rationalism, Paladin Books, London 1984, p. 19.

228 James Robert Brown, The Laboratory of the Mind – Thought Experiments in the Natural Sciences, Routledge New York/London 2011, p. 72f.

for empiricism is to attack and "undermine" all of rationalism's efforts at justification because its own position in this domain is rather hopeless. And yet, paradoxically, it has a fancy for and holds on to the abstract objects of mathematics that exist outside of space and time!

What is essential for my present inquiry and for the *visual turn* is that just as Plato sought to know "with the eyes of the mind," it is one of rationalism's fundamental methodological elements that *insight* into correlations and problem solutions is, at its basis, intuitive; a point I will address more concretely in the chapter on Descartes and Plato. In contrast, as suggested above, EAN Platonists essentially hold that numbers, proportions, relations, perfect geometrical figures, and functions are given in terms of immutable and atemporal "real objects" that are supposed to exist universally (not unlike Plato's alleged doctrine of ideas as misleadingly presented by Aristotle) and are discovered, for instance in mathematics, by becoming aware of them through intuition. Since this insight can never arise from sense experience (which is true, of course) but needs to be found by pure thinking, Platonism speaks of intuition in this context. This form of "intuition" must not be mistaken for Kant's "Anschauung" that is also translated as "intuition" in English, a fact that occasionally leads to confusions in the Anglo-American discourse. For in Kant's understanding, intuition means real, concrete vision, e.g. that using your fingers you learn to understand the addition $7 + 5 = 12$ by "seeing" it, intuitively constructing it, as one might say, and that in geometry, we even more strongly rely on the "eyes of the mind" to construct figures and proofs and intuitively demonstrate them in space. In contrast, intuition in Platonism (and in particular in mathematics) means the intuitive grasping of mathematical connections, mathematical truths, and is in a way conceived of as a kind of mental "vision" of these eternal entities. Thus, in his 1944 paper "Russell's Mathematical Logic," the famous Austrian mathematician Kurt Gödel argued as follows:

"*The assumption of such objects is quite as legitimate as the assumption of physical bodies and there is quite as much reason to believe in their existence. They are in the same sense necessary to obtain a satisfactory system of mathematics as physical bodies are necessary for a satisfactory theory of our sense perceptions . . .*"

This view is repeated in a famous essay Gödel wrote a while later, in 1947, "What is Cantor's Continuum Problem?":

"*Despite their remoteness from sense experience, we do have something like a perception also of the objects of set theory, as is seen from the fact that the axioms force themselves upon us as being true. I don't see any reason why we should have any less confidence in this kind of perception, i.e., in mathematical intuition, than in sense perception.*"[229]

[229] Kurt Gödel as quoted in: James Robert Brown, The Laboratory of the Mind – Thought experiments in the Natural Sciences, Routledge New York/London

Gödel explicitly and by way of example starts out from mathematical objects whose status is comparable to that of physical objects, so "*there is quite as much reason to believe in their existence*"! One can't be much clearer in stating that this is about the belief in the "existence" of these mental objects. But here is the really exciting part: the perception of these mental objects and the fact that the axioms of mathematics impose themselves on us as true, that is, that we become aware of them by something like a "mental vision," is very similar to both Plato's insight by "the eyes of the mind" and Descartes' "intuitive evidence" of "simple natures." But let us first return to Plato himself and try to reconstruct his findings regarding the eternal forms of mathematics and geometry and to clarify the real meaning of these ideas that are supposed to exist independently. The arguably simplest but also most impressive illustration – using an example also from geometry – of Plato's understanding of *idea* as well as of idealist rationalism's process of cognition is his reflection on the nature or idea of the circle as set forth in the philosophical excursus of his *Seventh Letter*. This letter, believed to be authentic,[230] is a biographically late document, which allows for an understanding of these thoughts as belonging to the mature Plato of about 75 years of age. Ernst Cassirer, dealing with the philosophical excursus of the Seventh Letter in his "Philosophy of Symbolic Forms," specifically notes that in this important passage an attempt is made, for the first time in the history of thought, "to define and delimit the cognitive value of language in a purely methodical sense."[231] But what is even more important, in terms of our inquiry, is that a geometrical figure is visually realized in the imagination – a circle line that can never be perfect in the real world but "only" in thought in its primal form, mathematically, if unambitiously, expressed as the set of all points (in a plane) that are (constantly) equidistant from a given center independently of space and time. Thus Plato teaches:

"*A circle is a thing spoken of, and its name is that very word which we have just uttered. The second thing belonging to it is its definition, made up of names and verbal forms. For that which has the name 'round,' 'annular,' or, 'circle,' might be defined as that which has the distance from its circumference to its centre everywhere equal.*"[232]

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2011, p. 71. See also Richard Tieszen, After Gödel, Oxford University Press, Oxford 2011.

230 See Ulrich von Wilamowitz-Moellendorf, Platon, Berlin 1920, pp. 281, 282; or Julius Stenzel, Über den Aufbau der Erkenntnis im VII. Platonischen Brief, in: Kleine Schriften zur griechischen Philosophie, Darmstadt 1956, p. 85.

231 Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 1, Language, New Haven & London: Yale University Press 1953, p. 124.

232 Plato, The Seventh Letter By Plato, Written 360 B.C.E., Translated by J. Harward (accessed at: http://classics.mit.edu/Plato/seventh_letter.html).

The first point of interest is that Plato refers to the circle, that actually is an idea, as a thing and first of all highlights two moments of this thing, firstly its name, that is, the phonetic sequence "circle," and secondly its definition.

He goes on to state:

"*Third comes that which is rubbed and drawn out again, or turned on a lathe and broken up – none of which things can happen to the circle itself – to which the other things, mentioned have reference.*"

This is Plato's key insight: circles can be drawn or made of whatever material, but nowhere in the universe will we ever be able to have the sensory experience of an unflawed, perfect circle. Every line, however fine, will at some point turn out to be irregular, every circle made of metal or some other material will at some point be "non-round." Descartes, who put the Platonic system on a modern basis, also refers to this insight in the context of the thinking of geometrical figures:

"*For although the world could undoubtedly contain figures such as those the geometers study, I nonetheless maintain that there are no such figures in our environment except perhaps ones so small that they cannot in any way impinge on our senses. Geometrical figures are composed for the most part of straight lines; yet no part of a line that was really straight could ever affect our senses, since when we examine through a magnifying glass those lines which appear most straight we find they are quite irregular and always form wavy curves.*"[233]

Therefore, while we can never actually perceive the perfect straight line or the perfect circle that corresponds to the definition of the circle, we can think it, or "see" it in our imagination, in accord with its definition or, rather, its function. So, this first step is essentially about the perfect form of the circle in "mere" thinking, it is not about the name, nor about the "imperfect" circles we can perceive with our senses. Erasing the chalk circle does not affect the model, the idea of the circle that is "merely" in our thought. Yet the drawn circle or the forged circle is a real thing and not a mystical illusion. As Cassirer notes, the point here is that the real circle participates in the "merely" thought circle, in the idea of the circle whose locus is not the observable world of sense experience but thought – which would definitely seem to be at odds with the empiricist dogma. Plato goes on to say:

"*Fourth, comes knowledge, intelligence and right opinion about these things. Under this one head we must group everything which has its existence, not in words nor in*

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[233] René Descartes, Meditations on First Philosophy, Author's Replies to the Fifth Set of Objections, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 262.

*bodily shapes, but in souls – from which it is clear that it is something different from the nature of the circle itself and from the three things mentioned before.*"[234]

Here, some of Plato's as well as rationalism's key ideas come to be expressed quite clearly. Firstly, we receive the *idea* of the circle from *rational insight* rather than the ever-imperfect circles or circular points or lines we find in the real world. This is also why we can never have perceived the perfect form of the circle by reading it off or abstracting it from the real world since the *perfect* circle simply cannot exist in reality and, therefore, can never have passively branded itself as such on our sense experiences! Conversely, we can never actively find the idea – and by definition perfect – circle through sense experience because it doesn't exist in reality. These "things," as Plato chooses to refer to them, have to be conceived of as a class of their own (circles, geometrical figures, etc.) – which means that Plato anticipated Frege and Russell by about 2300 years. The ongoing debate between the proponents of Platonism and their opponents, however, is about the existence of ideas, with attempts being made in the process to mark down Plato as a mystic with respect to the postulated *realm of ideas* and to contrast him with Aristotle.

The idea of the circle exists, and its location has even been specified by Plato: the soul! So even if elsewhere, Plato speaks of eternal ideas that the soul has seen before life and that, therefore, must have existed in a realm of ideas even before birth, these eternal ideas must nevertheless also be *in the soul* in order for them to be *a priori* effective; which is quite clearly stated at this point. From a modern perspective, we can now explore the question of what it may mean that something is in the soul or, by extension, how it could get there, leaving aside reincarnation for the moment. Since today we are somewhat more advanced in some (but not all) domains than at the time of Plato, the assumption would seem to be that certain structures and figures were dispositionally anchored in the mind in the process of evolution and are passed on, for instance, as forms in terms of Euclidean geometry. More on this later. Here, at any rate, we have it in black and white: the circle is a thing that has a definition or, in other words, a *concept of function*, namely "that which has the distance from its circumference to its centre everywhere equal," it is an element of a class, and it exists, namely *in the soul* or, in more modern words, in the consciousness. Plato goes on to say:

"*Every circle, of those which are by the act of man drawn or even turned on a lathe, is full of that which is opposite to the fifth thing. For everywhere it has contact with the straight. But the circle itself, we say, has nothing in either smaller or greater, of that which is its opposite.*"

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[234] Plato, The Seventh Letter By Plato, Written 360 B.C.E., Translated by J. Harward (accessed at: http://classics.mit.edu/Plato/seventh_letter.html).

This once more emphasizes that no circle produced in reality can ever be perfectly circular, for every real circle will have non-round parts and, therefore, participate in the straight or non-round as well. But neither the ideally circular nor the perfectly straight exist in reality anywhere in the universe. And yet there is the class of circles, and the definition of the circle or the circular will hold wherever we are in the universe. Even though we can transpose the circle obliquely on a curved surface, as in non-Euclidean systems, the basic problem or, rather, the basic principle remains unaltered since it holds true also for any form of non-Euclidean geometry with the curvature = 0. The fact remains that the idea of the circle, whether projected or not, exists in every circle that is perceived by the senses or in the imagination. And Plato clearly states where this idea exists: in the soul, that is, in the consciousness. Arbogast Schmitt, taking a yellow bronze circle as an example, has very vividly illustrated the logic of sense experience and concept:

"*Not everything that the senses reveal of this 'circle' has to do with its being a circle – the metal and its yellow color can be replaced by chalk and the color white without thereby changing its being as a circle. In contrast, one cannot play with the closed line and the equidistance of all points on the perimeter from the center without the circle thereby losing its identity as a circle. In order to establish that 'this thing here' is a circle, one certainly requires the senses which have to establish that the perimeter is uniformly curved and forms a closed figure … Thus, the senses can first fulfill their task (of identifying an object) only in service of a concept: someone who knows what a circle is can select those sense perceptions from a plurality that allow him to test whether the shape before him is really a circle.*"[235]

Now, if the perfect circle, being an idea, can obviously "exist" only in our consciousness but could never have been abstracted from the never-perfect circles found in reality, how come we have the idea of the perfect circle, in the first place? Empiricism's classical answer to this question is that this is accomplished by gradual, experience-based abstraction of the perfect circle from the plurality of observations of "non-perfect" circles. This doctrine of the gradual, piece-by-piece abstraction of universal ideas from sense experience, this alleged "abstraction" of perfect ideas from the never really immaculate particular observations of particular objects, is one of the typical, and fundamental, EAN mechanisms of self-deception. For without this supposed mode of abstraction there is no logical path for EAN to proceed from the sensory experience of a given particular, the "non-perfect" circle, to the *universal*, to *definition*, *law* (Paul Natorp) and *idea*. We will below deal in more detail with this problem of the self-deception inherent in this procedure. Interestingly, it is John Locke, of all

[235] Arbogast Schmitt, Modernity and Plato: Two Paradigms of Rationality, Camden House 2012, p. 213.

authors, one of the "founding fathers" of empiricism, who used the example of the circle only to highlight a distinct inconsistency in his own doctrine. Regarding the problem of universals, Richard Aaron identifies at least three different "approaches" in Locke:

"*Now at least these three strands – there may be more – are present in Locke's thought concerning universals. They are never wholly disentangled and there is no consistent theory of universals in the Essay. As one reads Book III and compares it with the drafts one cannot but feel that the theory is being developed in the very act of writing the book.*"[236]

But amid all this inconsistent thinking Locke also offers a worthwhile reflection on the circle:

"*For were there now no circle existing anywhere in the world (as perhaps that figure exists not anywhere exactly marked out,) yet the idea annexed to that name would not cease to be what it is; nor cease to be as a pattern to determine which of the particular figures we meet with have or have not the right to the name circle, and so to show which of them, by having that essence, was of that species.*"[237]

John Locke's reasoning here is very remarkable indeed, for he has not only adopted Plato's argument that the perfect circle cannot exist in reality and, therefore, cannot be received as an idea, be it simple or complex, from *sense experience*, but he also refers to an essence and idea of the circle that is atemporal. He describes it as a *"pattern"* we rely on to determine what is a circle and wherein all individual circles are comprised because they have the essence – which means that there is participation! Although we are not really told, in this context, *how* the mind is supposed to have gained possession of this perfect and atemporal *pattern*, this idea. The really intriguing point of this statement is that for the length of a paragraph Locke, the founder of modern empiricism, seems to have become a Platonist, and that in the process, he contradicts his own theory of abstraction as put forward in Book III of his Essay, where he asserts that universals are particular terms that have by abstraction been stripped of more and more of their characteristics and are, as a result, supposed to "represent" other particular terms. In the chapter on empiricism, I will deal in more detail with Locke's deficient theory of abstraction, i.e. his claim that by separating ever more particular characteristics from a particular thing one will arrive at the essence of this thing although, obviously, one cannot know that one is heading for it since one cannot know it before it has been determined. My interest here was merely to show that

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[236] Richard I. Aaron, John Locke, Clarendon Press, Oxford 1965, p. 202.

[237] John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, III iii, p. 268.

even Locke could not escape the power of the example of the circle, forgetting his own polemics and holding Platonic views!

*Rationalism* offers a fundamentally different solution to this problem, i.e. "Plato's problem" as Noam Chomsky described it in the context of his reflection on the process of concept acquisition in linguistics.[238] Plato suggests this paradigmatic solution to the problem in his "Meno" and "Phaedo" dialogues as well as in some passages of his "Republic." Oliver Hallich refers to the "eristic argument," quoting it from Plato in the original as follows:

"*Do you realize what a controversy you're conjuring up? The claim is that it is impossible for a man to search for what he knows or what he doesn't know: he wouldn't be searching for what he knows, since he knows it and that makes the search unnecessary, and he can't search for what he doesn't know either, since he doesn't even know what it is he's going to search for. (Meno, 80e)*"[239]

The problem arises, for instance, when searching for the concept of similarity in itself, for if we don't have an *a priori* concept of similarity, or at least the disposition for this concept to be activated in always the same form when we perceive things that seem similar, we can't search for similar things since we don't know what this relation is like in terms of function. Conversely, being confronted with two things that are really similar, we will not recognize them as similar since we do not yet have the concept of similarity. It is as if one wanted to measure something but lacked a measure for it. For Chomsky, "Plato's problem" serves a somewhat different line of reasoning, namely the "argument from poverty of the stimulus." If the "stimulus" from the external world, be it sound sequences, noises, signals or whatever, is insufficient to allow for the development of a grammatically correct language, then it is logical to assume that there must be some *a priori* knowledge or structure in the mind that will arrange the chaotic input of sounds in an orderly and meaningful way. In principle, both views amount to the same thing, namely that our mind, as Leibniz had pointed out, must of necessity preexist in our consciousness in terms of "necessary truths" before there is any input from sense experience. In his Phaedo and Meno dialogues, Plato suggests the fundamental approach that will open the way for a solution to this problem. It is the way of leading with questions, the way of a teacher whose questions serve the purpose of activating a student's innate faculty of thought and thereby let him find, step by step, his or her own logical solution to, for instance,

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238 A detailed description of the context is given by James McGilvray in his introduction to the third edition of Noam Chomsky, Cartesian Linguistics, Cambridge University Press, Cambridge/New York 2009. pp. 26–33.

239 Oliver Hallich, Platons 'Menon', Darmstadt 2013, p. 92.

a geometric problem.[240] In psychology, sudden *insight* – when "the scales fall from one's eyes" – is termed Aha! or Eureka moment. I will later explore this point in more detail.

Plato describes this process of knowledge acquisition as "recollection" because, obviously, we cannot have any prior knowledge of this sudden insight into the solution of the problem (we were in the *aporia*). But since it "came from within ourselves," the only possible explanation for him is that without our knowing it, the solution to the problem must have existed within ourselves, to be "retrieved," as it were, from there by adequate questions. The empiricist-analytic approach to a solution of this problem – arriving at the definition of the circle through the observation of thousands of circles, gradually, by many small steps, by "experience" – obviously does not lead to the desired result. For at some point of the reflection there must be a leap, an Aha! moment, a "flash of thought," an *insight* that makes one "see the light," as the saying is. When there is no structuring element of thought already present, accumulated *sense experience* alone, which in empiricism is supposed to be the *only* source of knowledge, can never suffice to gain new insights. Another procedure presented by Plato in this context is that of *association*:

"*… they know the lyre, and the image of the boy to whom it belongs comes into their minds. This is recollection.*"[241]

Connecting two representations, one of them a perception received from sense experience, the other one coming from the "inward" but "triggered" by, as it were, and connected to the former can also be called "recollection," although from a present-day perspective this may have a somewhat antiquated touch. I will return in more detail to these important issues – i.e. where the prior knowledge that exists "in the mind" may come from and how we are to understand it – in my discussion of the "Meno" dialogue and in the chapter on innate knowledge. In empiricism, *association* as an elementary mode of knowledge acquisition was primarily put forward by David Hume, and we will give a detailed description of all the deficiencies of this doctrine in our analysis of Hume's epistemology.

Astonishingly enough, a rather pronounced and deeply rooted "bad" Platonism turns up in the writings of the very "apostles" of analytic philosophy, e.g. Frege and Russell. The interesting aspect here is that in EAN writings on the history of philosophy Plato is framed, on the one hand, as the misguided, effusive "arch idealist" and, as such, opposed to the good, solid "empiricist" Aristotle. EAN proponents like to invoke Aristotle,

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240 Plato, Phaedo, in Plato, Five Dialogues: Euthyphro, Apology, Crito, Meno, Phaedo, Indianapolis/Cambridge: Hackett Publishing Company 2002, 73a–b, p. 110f.

241 Plato, Phaedo, in Plato, Five Dialogues: Euthyphro, Apology, Crito, Meno, Phaedo, Indianapolis/Cambridge: Hackett Publishing Company 2002, 73c–d, p. 111.

and do so frequently,[242] although actually Aristotle is much closer to Plato than he is to EAN. And the one issue where Aristotle definitely seeks to contrast with Plato, namely the alleged reification of ideas, is the very issue that Frege and Russell choose to resurrect.[243] A more detailed discussion of the relation between Plato's and Aristotle's thinking would go beyond the scope of this book.[244] At any rate, there is plenty of references to Plato in the "apostles" of the analytic "movement," e.g. Gottlob Frege and Bertrand Russell, but also Alfred North Whitehead whose famous statement that "*the safest general characterization of the European philosophical tradition is that it consists of a series of footnotes to Plato*" has been and still is a much-quoted phrase. But much-quoted as it may be, when all is said and done, EAN clings to the very type of empiricist sensualism that Plato himself, with reference to the aporias of the sophists, repeatedly characterized as completely inadequate, and that is diametrically opposed to his own way of thinking.

It is, therefore, far from natural for empiricists to believe in the existence of a realm of objective ideas in a Platonic sense, given that the first EAN commandment is the belief in sense experience and not at all in a realm of extrasensory ideas! While in "Our Knowledge of the External World" (1926) Russell, as mentioned above, still groups Plato more or less with the mystics,[245] his "History of Western Philosophy" (1950) suggests a fundamentally different attitude: "I should agree with Plato that arithmetic, and pure mathematics generally, is not derived from perception." In the further course of his reasoning, he even comes quite close to the idea that universals, or Platonic ideas, exist in reality, that is, to a realistic stand in terms of the so-called "universalia argument."[246] Coming from one of the EAN "brothers in the faith," these are strange propositions indeed. However, nobody seems to be overly worried by this stark contradiction between dogmatic sensualism and dogmatic Platonism, i.e. the "realm of ideas."

Another example, no less astonishing, can be found in Karl Popper. While he cannot be directly grouped with EAN, his notoriously polemical work "The Open Society and Its Enemies" (1945) exhibits an extremely anti-Plato and anti-Hegel sentiment that has substantially contributed to

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242 A case in point is Ernst Tugendhat, Traditional and Analytical Philosophy: Lectures on the Philosophy of Language, Cambridge University Press 1982.

243 Aristotle, Metaphysics, e.g. Book I (Book Alpha), 987b–988a, Penguin Classics 2004, pp. 23–25.

244 For a differentiated synopsis of Plato's and Aristotle's thinking in contrast to nominalism, see Arbogast Schmitt, Modernity and Plato: Two Paradigms of Rationality, Camden House 2012.

245 Bertrand Russell, Our knowledge of the External World As a Field for Scientific Method in Philosophy [1914], Routledge 2005, p. 55.

246 Bertrand Russell, History of Western Philosophy [1946], Routledge 2004, p. 148f.

the discrimination against idealism in the post-World War II era.[247] In this book, Plato is stylized as the spiritual father of totalitarianism, which in the Cold-War era primarily meant fascism and communism, and the blame for them is put on Plato (in Popper's misrepresentation). But in his 1972 work "Objective Knowledge," Popper does a complete reversal. He not only introduces a world of independent, ideal entities that closely resembles Plato's "realm of ideas" but even explicitly invokes Plato in this context. Seeking to lend an air of scientific rigor to this realm of ideas, he calls it "world 3". So, somewhat tongue-in-cheek, one might argue that if Plato, as seen by Popper, is responsible for the totalitarianisms of all times, and if Popper largely concurs with Plato's ideas, then Popper himself had become part of the totalitarian demon – but that's neither here nor there! At any rate, Popper frankly acknowledges:

"*Thus what I call 'the third world' has admittedly much in common with Plato's theory of Forms or Ideas, and therefore also with Hegel's Objective Spirit, though my theory differs radically, in some decisive respects, from Plato's and Hegel's. … My third world resembles most closely the universe of Frege's objective contents of thought.*"[248]

Which, actually, is a rather absurd turn for the author of "The Open Society and Its Enemies." What is even more bizarre is his reference to "*Hegel's Objective Spirit,*" given that on reading Popper's works, one can't help feeling that his knowledge of Hegel is from secondary sources mainly and that he did not really get down to the basics of his doctrine. Which brings us to Gottlob Frege, another "apostle" of the analytic "movement." Frege is a peculiar mix of mathematical reasoning and philosophy in the transition period from the last days, as it were, of Kantianism[249] to the heyday of positivism. What comes to be expressed in his attempts to objectivate, on the analogy of things, human thoughts, logic and mathematics by postulating a distinction between sense and denotation is an effort to shield thinking against "psychologism." Actually, his entire understanding of a mathematized concept of function, of reality and sense experience, representation, thoughts, the process of abstraction, extension and intension, truth value etc. is based on the Platonistic postulation of a so-called "third

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247 Karl Popper, The Open Society and Its Enemies [1945], Princeton University Press 2013.

248 Karl Popper, Objective Knowledge: An Evolutionary Approach (1972), Revised edition, Oxford University Press 1979, p. 106.

249 See the last chapter in Gottlob Frege, The Foundations of Arithmetic: A Logico-Mathematical Enquiry Into the Concept of Number (1884), Basil Blackwell, second revised edition, 1989, pp. 99ff., where it becomes obvious that he has not really understood Kant.

realm"[250] of atemporal, abstract, objective entities such as numbers or mathematical operators. These entities are supposed to have always existed in this "spirit world" of thoughts that, by way of representation, is correlated with ontic entities and objects of the real world and just activates these existing ideas in the act of thinking. In his short essay "17 Key Sentences of Logic," Frege writes, among other things:

(Sentence 3): "*In the case of thinking it is not really ideas that are connected, but things, properties, concepts, relations.*"

This means that in thinking, things (!) objectively belong to the same category or level as concepts or properties, that they are existing entities (that is, actually, objectified thoughts or spiritual things) that are simply connected in a mathematical way. He does speak of thinking, it is true, but this only makes one wonder what kind of thinking this is supposed to be. In Sentence 10, he uses sentences, that is, language, to connect these objective thoughts to objects, which implies that the latter must be tacitly known before they are recognized (the above-described EAN mechanism of self-deception in action):

"*And so too the sentence 'this table is round' is the expression of a thought only if the words 'this table' are not empty sounds but designate something specific for me.*"

In his highly readable "disassembly of Frege," an appendix to his book on Kantian categories, Michael Wolff, too, draws attention to this equating of thoughts and things:

"*The literature on Frege often fails to notice that Frege's assimilation of logic and arithmetic was not only the result of what is called his 'logicism' (…) but also (and primarily) rests on his assumption that the fields of application of logic and arithmetic are indistinguishable. As for arithmetic, there were good reasons for Frege to assume that since it was applicable to all that is countable, it was about everything 'that can be an object of thought: the ideal as well as the real, concepts as well as objects, temporal as well as spatial entities, events as well as bodies, methods as well as theorem; even numbers can in their turn be counted.'*"[251]

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250 Although Frege was a German National racist and anti-Semite (see his journal entries in: Gottlob Frege, Tagebuch, Deutsche Zeitschrift für Philosophie, Berlin 42 (1994) 6, pp. 1067–1098) the term "third realm" – "drittes Reich" ("third Reich") in the German original – in this context only refers to an eternal "Reich," imagined by Frege, of abstract objects, similar to Plato's approach, and has no political implication. Paradoxically, Frege seems to have been exempt from the anti-German resentment in the Anglo-American area?!

251 Michael Wolff, Die Vollständigkeit der kantischen Urteilstafel: Mit einem Essay über Freges Begriffsschrift, Frankfurt / Main1995, p. 219f.; Wolff quotes Frege from: Gottlob Frege, On Formal Theories of Arithmetic, in: Gottlob Frege, Collected Papers on Mathematics, Logic, and Philosophy, Brian McGuinness (ed.), Basil Blackwell 1984, p. 112. Frege's lecture: Gottlob Frege, On Formal Theories

So far, Frege could still be thought of as a naïve realist who, once again, assumes that the particular table preexists as a simple object that can be hammered on with one's finger and is directly known in thought. But then, in Sentence 11, comes the following key statement that is undoubtedly reminiscent of Plato:

"*'2 time 2 is 4' is true and will continue to be so even if, as a result of Darwinian evolution, human beings were to come to assert that 2 times 2 is 5. Every truth is eternal and independent of being thought by anyone and of the psychological make-up of anyone thinking it.*"[252]

This thought is remarkable for more than one reason. On the one hand Frege, one of the founders of the analytic "movement," speaks of an eternal truth that is independent of thinking; and does so not as a language game. Then – referring to the "Darwinian evolution" of man – he separates nature whose product man with his brain is, after all – from eternal truth, conceived of in mathematical terms. We thus get several disrupted, fragmented worlds: there is thinking, of which one does not know where it comes from and why it operates in this and not in any other way. And there are things outside ourselves that we reproduce by way of sense experience (*"the retinal image"*[253]) but of which we do not know exactly how they come to be present in thought in their objective form, "in themselves," for according to Sentence 3, properties, things and relations as well as their concepts are located at one and the same level of thinking and are connected like elements of sets. In other words, things are not synthesized by thinking as they are in Kant but are tacitly assumed to have all along been present, smuggled in, as it were, in the interplay of concepts. And then there is "nature" that is thought capable of producing beings who think that 2 x 2 = 5 is correct. Thus nature is not seen as a physical-biological texture ruled by physical laws but as a foreign world capable of producing beings that have a totally different way of doing math. On the other hand, as Gottfried Gabriel notes,[254] Frege insists that our logic, our judgment, is grounded in our nature:

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of Arithmetic (Lecture at the July 17, 1885 meeting of Jena's Society for Medicine and Natural Science), in: Gottlob Frege, Collected Papers on Mathematics, Logic, and Philosophy, Brian McGuinness (ed.), Basil Blackwell 1984, p. 112.

252 Gottlob Frege, 17 Key Sentences Of Logic, in: Gottlob Frege, Posthumous Writings, Oxford: Basil Blackwell 1979, p. 174.

253 Gottlob Frege, On Sense and Nominatum, in: Aloysius Martinich, The Philosophy Of Language, Oxford University Press 2001, p. 201 [Translated by Herbert Feigl from the article "Über Sinn und Bedeutung," Zeitschr. für Philos. und Philos. Kritik, 100 (1892)].

254 Gottfried Gabriel, Windelband und die Diskussion um die Kantischen Urteilsformen, in: Marion Heinz/Christian Krijnen (ed.), Kant im Neukantianismus – Fortschritt oder Rückschritt?, (Königshausen & Neumann), Würzburg 2007, p. 91.

"*Stepping outside logic, one can say: nature and external circumstances force us to judge, and when we judge we cannot discard this law (…) but have to acknowledge it if we do not want to lead our thinking into confusion and in the end abandon judgement altogether.*" … going on to say that negating basic laws of our logic would amount to "*an attempt to jump out of one's own skin …*"[255]

But according to Frege, there is the "third realm" of eternal and unconnected spiritual entities that exist independently of thought and nature but are realized and carried out in the act of thinking. Which makes it definitely impossible to explain how and in what sense these entities can be connected to the nature of our cognitive make-up since Frege, on the one hand, speaks of "*our nature*" and "*jump(ing) out of one's own skin*" but, on the other, claims that this "nature" only serves to realize the forms, completely separated from it, of the "third realm"! Furthermore, the origin of this nature of thought, just like the origin of the "third realm," is entirely presupposed. One would be hard put to find a more massive logical "disconnect" of separate worlds and levels in any of philosophy's great logicians.

This encapsulated and relationless concept was subject to criticism by Paul Natorp, as well:

"As it is, Frege relies on the traditional concepts of essence and existence." Which Natorp explicates by referring to the mathematical expression, typical of Frege, 'X falls within the concept of A': "*This, however, is entirely assumed in the terms of traditional logic, i.e. in an Aristotelian sense according to which falling within a concept undoubtedly denotes the relation between the (given!) particular and the universal.*"

Thus the fundamental EAN error, that is, the self-deception with respect to the objectifying givenness and simple, immediate presence of objects is once more revealed as the basis of this thinking. Natorp goes on to highlight the abstract, encapsulated nature of concepts in Frege, that are ultimately based on not-thought-through Platonistic reasoning:

"*(Frege), it is true, seeks to capture, like Plato, the pure content of thought but does so, like Plato in his beginnings, one-sidedly in an ontic rather than genetic manner. For him, the pure figures of thought are forever fixed, there is no generating of pure thought contents and no forming of relations but only stationary relations among stationary thought points.*"[256]

Frege's conceptual world thus turns out to be "bad Platonism" and, as a consequence, completely alien to Kant's synthetic-dynamic concept.

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255 Gottlob Frege, Basic Laws Of Arithmetic (1893), Oxford University Press 2016, p. XVII.

256 Paul Natorp, Die logischen Grundlagen der exakten Wissenschaften, Leipzig/ Berlin 1910, p. 114f.

Therefore, Frege's concept of function, limited by this encapsulated, relationless, bad Platonic, mathematical understanding, is inferior to the concept of function of Neo-Kantianism as developed by Paul Natorp and, then, primarily by Cassirer and specifically conceived and developed as resulting from a plurality of relations. I will return to the issue of the origin of the concept of function in the excursus at the end of this book, when the theory of visual thinking has been spelled out.

This Plato-inspired independent "third realm" or "third world" has given rise to a particularly rigid style of language in positivism and, in Frege, to a peculiar "passivistic" tone that reflects his view of thinking as other-directed by the eternal entities: "*The fundamental logical relation is that of an object's falling under a concept*"[257], "*… the general form of a judgement-content that deals with an object a and permits of the insertion for a …*", "*… every object which falls under F stands in the relation φ to an object which falls under G.*"[258] As a consequence, there is an abundance of expressions such as "… shows itself," "…is rejected," "… follows," "falls under," or "we have the impression," something is "given," etc. This peculiar "passivistic-objectivistic" language, this "jargon of heteronomy" where human thinking is other-directed by eternal entities and operations, where thinking just occurs, where the mind does not actively reflect on and solve ever novel problems but merely acts as the executive body of eternally and independently existing entities has subsequently rubbed off also on the positivism of Carnap and analytic philosophy. For the proponents of analytic philosophy, the "jargon of heteronomy" seems to convey a sense of utmost objectivity and mathematical precision as well as the illusion of a particularly sound and impeccable discourse (as opposed to the "ramblings" of the mystical, stoned, eccentric rationalists). Michael Dummett explains Frege's "mythology of the third realm" as follows:

"*This mythology serves Frege (…) as a bulwark against psychologism which they opposed. If, now, our capacity for thought is equated with, or at least explained in terms of, our ability to use language, no such bulwark is required: for language is a social phenomenon, in no way private to the individual, and its use is publicly observable. It is for this reason that the linguistic turn may be seen as a device for continuing to treat thoughts as objective and utterly disparate from inner mental events, without having recourse to the platonistic mythology.*"[259]

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257 Gottlob Frege, Comments On Sense and Meaning, in Gottlob Frege, Posthumous Writings, Oxford: Basil Blackwell 1979, p. 118.

258 Gottlob Frege, The Foundations of Arithmetic: A Logico-Mathematical Enquiry Into the Concept of Number (1884), 2nd revised edition, Basil Blackwell, second revised edition, 1989, p. 88.

259 Michael Dummett, Origins Of Analytical Philosophy, Bloomsbury Academic 1993, p. 124f.

This commentary is illuminating in more than one respect. On the one hand, it highlights Frege's effort to understand the active and creative work of the consciousness not in terms of a biological-rational achievement but in terms of the passive occurrence of objective entities that reside in an abstract realm of ideas. On the other, it is very instructive in its explanation of the turn, described above, to language as a means of reintegrating the entities' isolated eternity and other-worldliness into the real world of man and as the medium that, due to its nature as *"a social phenomenon"*, was from then on expected to guarantee logical objectivity without presupposing a "third realm" of ideas. According to Dummett, this approach was supposed to ensure the objectivity of thoughts, in contrast to Plato's mythological foundation of forms and ideas. This implicitly, if wrongly, suggests that something that has been socially established as a social phenomenon, i.e. language, can guarantee objective truth. But witch trials, the flat earth or totalitarian systems also were "social phenomena" – so can phenomena like these ever be guarantors of objectivity? They can't, nor can language as a "*social phenomenon*"!

We have already seen that for Plato, ideas are anchored in the soul, that is, in the consciousness, and this could of course be even better explained in a non-mythological, scientific manner. Here we once more reach the point where this last EAN attempt at salvage and rebuild is frustrated by Noam Chomsky's groundbreaking insights. For if language rests on an *innate*, *universal grammar*, then it is quite sufficiently accounted for, in its structures, by biology as well as evolution and does not require the function highlighted by Dummett, i.e. *"a social phenomenon, in no way private to the individual, and … publicly observable [in its use]."* In EAN, language actually assumes the mythical function of the "third realm" since it is supposed to serve as the new bulwark against "psychologism." But in truth, language itself is innate in its basic grammatical structure and culturally and socially formed in other respects – and is thus, historically speaking, also more or less accidental – but in no way based on *sense experiences*. Thus, the elements simply don't fit together in EAN, which remains an artfully glossed-over patchwork, no matter how you look at it. But one interesting question is still unanswered: in what way, or where, do these abstract entities of the "third realm" "exist"? For, on the one hand, there is an almost paranoid fear in EAN that we might live behind a "veil of ideas" and be thus deprived, by the doings of – condemnable – idealism and rationalism, of the immediate access to the beloved things; but then, on the other, there is EAN's postulation of a separate "third realm" of ideas. And, as even more pressing issue, where do these immutable and perfect ideas come from if all our knowledge is assumed to be exclusively based on *sense experiences*?

A rationalistic Neo-Kantianism could give a relatively conclusive and simple answer to these questions: the "eternal" forms and ideas originate from the innate, dispositionally pre-structured categories of human thinking that we "project," by thinking, onto the always imperfect, particular, existing structures of the real world or "produce" as a result of adequate stimulation. We see the "flawed" circle, i.e. the circular arrangement of irregular points, and we have the innate faculty to visually perfect this "flawed" gestalt, and the innate faculty to "see," to think, the perfect circle just as we can see and think other Euclidean geometrical forms. This is the reason why it is potentially and structurally native to man, even though the idea or definition of the circle cannot, of course, be floating around in a "realm of ideas." But why do we have precisely these faculties of thinking rather than others, how did they come into being and how can they be logically realized? This will be discussed in both the chapter on *vision science* and the chapter on *innate knowledge*. While Plato's doctrine provides the substantial and inherently consistent idealistic starting point for rationalism, and while its basic elements remain logically and epistemically comprehensible in their argumentation, and topical to the present day, the "bad" Platonism of the "third world" or "third realm" is a peculiar alien element in EAN, contrasting as it does with EAN's otherwise sweeping rejection of all of Plato's other thought elements and positions.

## Rationalism and empiricism: definitions and differences

Before engaging in my account of the epic conflict between rationalism and empiricism I would like to outline the essential rationales, definitions and oppositions in the philosophy of modernity, and the consequences they have for the debate. Regarding rationalism, my exploration of fundamentals will rely on the work of Descartes, for although it was Plato who created the bases of this thinking and Descartes can be understood as a modernizer of Plato while Kant retained essential elements of rationalism, but the latter departs from rationalism in some key theses and, as Hans Vaihinger notes in his famous "Commentar zur Kritik der reinen Vernunft," verges on empiricism to the point of resorting to the concepts of "a priori" and "pure reason" to avoid having to use the term of rationalism to denote the opposite of empiricism. It is only in Kant's later writings that the term "rationalism" reappears.[260] Kant acknowledges innate knowledge or innate faculties only reluctantly and by allusion but, on the other hand, refers to the "given" and the "data of our senses." This "stark

[260] Hans Vaihinger, Commentar zu Kants Kritik der reinen Vernunft, Stuttgart 1892 (reprint), Vol. 1, p. 169.

contrast of sensibility and understanding, intuition and concept"[261] has been criticized by many commentators, among them Salomon Maimon, Sigismund Beck and Jürgen Bona Meyer. From the perspective of rationalism, Kant was "taken in," as it were, by empiricism's overemphasis on sense experience, and his assumption of the "given" – of which we shall see that there is no way for anything to be passively given to us, not even metaphorically – makes unnecessary concessions to empiricism. Still, with Kant's synthetic a priori judgments, transcendental aesthetic (form of space and time), mathematics and geometry, the self and the theory of categories, the core of rationalism is retained. Given the vast thematic scope and unmanageable number of publications on rationalism, empiricism and related subfields, I will confine myself to those fields that are essential to the visual turn and rationalistic Neo-Kantianism. The relevant issues primarily relate to visual perception, abstraction, rational insight, ideas, and the confrontational field of what John Locke describes as "innate principles and ideas."

But making a clear distinction between rationalistic and empiricist thinking is, in turn, not without difficulties because certain thought elements found in the exponents of one of the "sides" could also be construed as belonging to those of the other side, and there even is an increasing tendency to see the commonalities of both philosophical currents rather than what separates them. One such attempt is the very creative and comprehensive work of Hans-Jürgen Engfer, "Empirismus versus Rationalismus? – Kritik eines philosophiehistorischen Schemas."[262] Although I cannot see eye to eye with the basic theses of his book since I start out from the assumption that there is absolute opposition between the basic views and methods of empiricism and rationalism, I do agree that there is a number of points where different philosophers actually seem to adopt similar approaches, or at least thought positions that appear to be similar. At any rate, Engfer describes the difference between empiricism and rationalism as follows:

"*Where the empiricist holds that all our concepts and judgments are based on experience, rationalism has no equally sweeping claim that all our concepts and judgments stem from reason. Rather, the rationalist can indeed accept that many and perhaps even most of our concepts and judgments are in some way or other dependent on experience as long as there is acknowledgement that other concepts and statements are independent from experience and 'rational'. At that level, empiricist and rationalistic positions are not mutually exclusive antagonisms but indeed overlap in an important field …*" The conclusion Engfer draws from this – not quite accurately stated –

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261 Hans Vaihinger, Commentar zu Kants Kritik der reinen Vernunft, Stuttgart 1892 (reprint), Vol. 2, p. 22.

262 Hans-Jürgen Engfer, Empirismus versus Rationalismus? – Kritik eines philosophiehistorischen Schemas, Paderborn 1996.

contrast is that "*… the difference here is reduced to the fact that the empiricist understands reason to be nothing but this faculty of formal reasoning, of whose potential he may have a more skeptical view, while the rationalist sees it as an independent source of innate ideas and first principles.*"[263]

In my view, however, a closer look at the basic theses of empiricism and rationalism reveals a much sharper contrast: Engfer (in line with many other authors), firstly, speaks of *experience* in general as the basis of all knowledge in empiricism. But precision requires us to say that according to its own doctrine, this "basis" of empiricism is supposed to exclusively stem from *sense experience* that is copied by a completely passive mind in the manner of a photographic plate or camera. In truth, however, we do not receive sense experiences unfiltered and independently of thinking; rather, they are from the very beginning, that is, from their first contact with human tissue, construed, transformed and, in a sequence of stages and cognitive processes, brought to our consciousness by cognitive processes. The structures, relations and, above all, *functions* of things as well as the concept and the perspective that orient our way of considering things are by no means per se contained in and capable of being "read off" from *sense experience*, especially if this perspective changes.

Secondly, and crucially, "experience," so readily invoked by empiricism, by far exceeds the scope of mere *sense experience* that can be assumed to be the only one taken into account by empiricism. For there is my perception of an object at point t1 in time, and then my perception of it at point t2 in time, and to recognize the difference, the delta, between both states of an object or a situation and, then, to *reflect on this difference* and *draw a conclusion* from it is to arrive at a *judgment*, that is, to think – it is not the merely passive reception of *sense experiences*, nor is it mere "*observation*." Furthermore, what the German term "Erfahrung" – "experience" – suggests, rather than sense experience, is a continual learning process in the course of which a person gains knowledge and becomes wiser through reflection. "Experience," therefore, is the result of something that empirically happens to me, and of my remembering, structuring, rationalizing and analyzing this event and its course and drawing the relevant conclusions from it that will allow me to take a more adequate course of action when a similar situation arises. All this implies a multitude of analyses, steps in reasoning, self-reflection and creative proposals for solution and is to do with direct sense experience only insofar as the

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[263] Hans-Jürgen Engfer, Empirismus versus Rationalismus? – Kritik eines philosophiehistorischen Schemas, Paderborn 1996, p. 12f. In what follows, Engfer refers to: Rainer Specht, Zur Vernunft des Rationalismus, in: Rationalität. Philosophische Beiträge, (ed.) Herbert Schnädelbach, Frankfurt / Main 1984, pp. 70–93. This is a rather poor essay that lets reason and rationalism virtually slip away in the mist of analytic philosophy.

latter marks the most primitive, unprocessed stage of what happened to me. "Experience" results from thinking, it is not the work of the senses! It is about a *function* of the object, it relates to an abstract network of *relations*, a business model, a lawsuit, for instance, it is not independently contained in or capable of being read off from *sense experience*. This leads to a host of further difficulties: sense experiences are always changing and fluid, so if sense experiences or sensory stimuli were to be a direct source of experience this would even more fundamentally presuppose that they can be perceived by us objectively and "such as they are" (we will later show that in the modern theory of vision, the very opposite is true) and allow for some kind of meaning to be directly derived from them. Furthermore, as a term, experience in the sense empiricists tend to refer to it is extremely misleading at least in the German language because it is suggestive of the everyday sentiment of the wise father ("experience is what counts in life, my son, so be an empiricist, for the unworldy rationalists live behind a veil of ideas and have no idea of what life is really like!") but actually, in philosophical terminology, its meaning is restricted to pure *sense experience*, the stimulations of the retina, as Frege and Quine like to refer to it, and does not cover "experience" in a more general sense. The latter is, at best, obtained by subreption.

So, here, the differences run much deeper. Hans Poser describes the diverging assumptions about the basis of knowledge as follows:

"*The empiricists see it in what is given by experience whereas the rationalists see it in reason … No empiricist thinks that he can do without reason; but for him reason is an instrument rather than the basis for building new and certain knowledge since, as Locke argues, nothing can be in the understanding that was not previously in the senses. The rationalist, in contrast, will not deny the necessity of making experiences; but he will argue that without the filter of the understanding, without its capacity of critically examining and interrelating this material knowledge, experience-based cognition would not be possible at all.*"

This framing of the contrast is in line with my own argument. Poser goes on to say:

"*Thus, for him, reason is what is primary – and reason does not only consist of a logical-combinatorial understanding but of contents that must at least be dispositionally innate in order for us to be able to gain and justify knowledge. The certainty and the established tenets stem from reason alone.*"[264]

The crucial argument here is that "the certainty and the established tenets stem from reason alone" that "must be … dispositionally innate." Engfer defines the basic positions of empiricism and rationalism in terms of the

[264] Hans Poser, René Descartes, Stuttgart 2003, p. 10.

analytic linguistic philosophy, that is, by the three classical steps of concept, proposition and conclusion:

Empiricism means

1. "that all concepts … are based on experience.
2. that the validity of propositions that are not deducible from other propositions is based on experience and
3. that all other propositions that are not directly based on experience must be deducible from propositions that are."

This basically means that all concepts and propositions, that is, ultimately, all our knowledge must stem from "experience" or be deducible from it, which in the final analysis also means that it must stem from it. Here again, the expression "experience" remains vague and should actually read *sense experience*.

The rationalistic position, in contrast,

1. "assumes the existence – often under the heading of innate ideas – of concepts that are independent of experience, i.e. number, substance or force;
2. asserts the validity of propositions that are independent of experience and are based – often under the heading of innate principles or truths of reason – on rational insight alone, and
3. assumes that – based on these principles – further propositions can be deduced that are valid – like the above propositions – independently of all experience."[265]

While this definition is basically not wrong it fails to sufficiently highlight some of the points that are essential for our debate. I will therefore include a second opinion from a different source. Since this source is from the Anglo-American region we can safely assume that it is beyond suspicion of pleading in favor of rationalism. It is the article "Rationalism vs. Empiricism" of the Stanford Encyclopedia of Philosophy.[266] This article starts out with acknowledging that there is indeed conflict between empiricism and rationalism and, then, goes on to present their respective strategies as follows:

"*Rationalists generally develop their view in two ways. First, they argue that there are cases where the content of our concepts or knowledge outstrips the information that sense experience can provide. Second, they construct accounts of how reason in some form or other provides that additional information about the world.*"

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[265] Hans-Jürgen Engfer, Empirismus versus Rationalismus? – Kritik eines philosophiehistorischen Schemas, Paderborn 1996, p. 12.

[266] http://plato.stanford.edu/entries/rationalism-empiricism/, Copyright 2013, Peter Markie.

This is right in principle: information based on sensory perception cannot suffice to obtain certain knowledge but needs to be supplemented by additional, and structured, knowledge. This is the approach of rationalism. The article goes on to say:

"*Empiricists present complementary lines of thought. First, they develop accounts of how experience provides the information that rationalists cite, insofar as we have it in the first place. (Empiricists will at times opt for skepticism as an alternative to rationalism: if experience cannot provide the concepts or knowledge the rationalists cite, then we don't have them.) Second, empiricists attack the rationalists' accounts of how reason is a source of concepts or knowledge.*"

Empiricists, in contrast, seek to show how "experience" (read: *sense experience*) is supposed to lead to certain knowledge, and when this fails (which, of course, it always does because it cannot succeed) fall back on the second strategy, i.e. attacking rationalism's patterns of explaining how certain knowledge is to be obtained with the help of the understanding and reason. This account is highly accurate since it very clearly highlights the empiricist dilemma. Due to the dogma brought into the world by Locke and Hume that all knowledge is exclusively (!) based on sense experience, empiricism was maneuvered into a hopeless position. So, as a logical consequence, with their own stance becoming ever more precarious, it has to be compensated for by strategy number two, namely continuous attacks on the positions of rationalism. If the claim had been that our knowledge stems for the most part from sense experience, there would have been more leeway, some sort of "bargaining chips," even though the question of the universality and necessity of those forms that cannot be found in reality – as illustrated by the case of the circle – would still remain. Instead, a definite stand is taken, and affirmed, even in the more recent, language-oriented EAN writings of, for instance, Alfred Ayer. His criterion of verification is as follows:

"*Let us call a proposition which records an actual or possible observation an experiential proposition.*"[267]

Observation, directly reproduced (copied!), is thus clearly identified as the basis of linguistically expressed thoughts. But this only serves to push further the inconsistency of what experience without structuring by thinking is supposed to be, in the first place. After all, what distinguishes "observation" from the simple raining-down of photons on the retina of the observer is that observation already implies a focus on something, a figure or structure, that does not occupy our whole "field of vision" (as

[267] Alfred J. Ayer, Language, Truth & Logic, Dover Publications 1946, p. 38.

Adorno once called it[268]). It implies that certain patterns of perception are activated, that an object is isolated against its background, that movement, color, contrast and dozens of further aspects are differentiated and, finally, that conceptual knowledge is synthesized against a theory- and culture-laden background (as in Hanson's above-mentioned case of the two microbiologists). Observation is nothing to do with the isolated eye on which the photons rain down. But let's for once take it as stated by Ayer and accept that the basis of empiricism has suddenly become observation rather than experience. Alfred Ayer goes on to say:

"*It must, of course, be admitted that our senses do sometimes deceive us… But in all such cases, it is further sense-experience that informs us of the mistakes that arise out of sense-experience… That is, we rely on our senses to substantiate or confute the judgments which are based on our sensations.*"

Now this really is a "jewel" of empiricist thinking: while "sense experience" is finally more precisely defined as the basis of our knowledge, misperceptions are admitted, but the only way for us to become aware of them is by further sense experience that is expected to kindly inform us of any mistakes made in the first sense experience, although without rational evaluation we cannot even know that misperceptions occurred because this would require the use of logical identification and judgment but never sense experience. At the same time, Ayer refers to judgements, but these are again supposed to stem from sense experience alone! And in the same breath he goes on to say that

"*…it is further sense-experience that informs us of the mistakes that arise out of sense-experience.*"[269]

Thus, due to misperceptions, we make mistakes (while it remains unclear what mistakes are supposed to mean with respect to sense experience alone) but, then, further misperceptions are supposed to kindly correct our judgment ("inform[…] us of the mistakes") which in turn is grounded in misperceptions (rather than rational judgments) while we are making further mistakes that sense experience can know nothing about! In this way we could stagger on from misperception to misperception. But if judgments are not grounded in the laws and rules of thinking but in ever-new sense experiences that in turn imply misperceptions, how is this supposed to ever let us arrive at a judgment that is universally valid and necessary? Thus, according to Alfred Ayer, empiricism's criterion of truth is the mistake, i.e. misperception, but the only way for us to become aware

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[268] Theodor W. Adorno, Kant's 'Critique of Pure Reason', Stanford University Press 2001, p. 104.

[269] Alfred J. Ayer, Language, Truth & Logic, Dover Publications 1946, p. 39.

of its misleading nature is the information kindly provided, once again, by sense experience – a "pearl," and true nadir, of deficient EAN thinking.

So, since one doesn't get far with this kind of feeble reasoning, empiricism must proceed to the second strategy, that is, continuous attacks on rationalism, in order to hide its own nakedness and still be king. And this is where the conflict becomes really interesting. How is it possible for the universal and necessary knowledge of a triangle or a position on a chessboard to be gained by observation? One day, I spend eight hours observing a triangle and collecting sense experience. The next day I spend ten hours observing the triangle from a different perspective. Collecting sense experiences by observation from ever-new perspectives will not get me anywhere. If it suddenly becomes obvious to me that (in the Thales circle) the angle in a triangle constructed with the two endpoints of the diameter of a semicircle and another point of this semicircle will always be a right angle, then what is at work here is a "flash of inspiration" of reason, a *rational insight*, rather than hours of triangle observation. The same is true for the chessboard. What decides on victory or defeat is not a series of varying sense experiences or the color reflections of the chessmen but pure thinking and combining. And this is true for chemistry, physics, biology and every science as well as everyday life. We do see events with our eyes, we do receive the rays of light, but everything else is the work of the imagination and the understanding. It is by reflection that we gain insight into the nature of things, understand their functions, their relations, which could never be read off from sense experience alone. Rationalism, on the other hand – and this is really essential for a correct understanding of it – does not disparage sense experience but sees it as a highly important, if not always reliable, starting point for obtaining certain knowledge.

Considering the longstanding misrepresentation and falsification of the rationalistic doctrine in the course of the past fifty years, I will now try to give an up-to-date reconstruction of this doctrine as I see it, so as to make sure that the account of the conflict between empiricism and rationalism will proceed on a level rather than lopsided field. Thus, Descartes, seeking first of all to put right the rumor, zealously kept alive, that rationalists will disparage sense experience, begins his "Optics," his detailed scientific discussion of visual perception, by stating:

"*The conduct of our lives depends entirely on our senses, and since sight is the noblest and most comprehensive of the senses, inventions which serve to increase its power are undoubtedly among the most useful there can be.*"[270]

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[270] René Descartes, Optics, in René Descartes, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 152.

Are these the words of someone intent on disparaging sense experience? No, they aren't! Kant, too, will argue that knowledge begins with sense experience, although it quickly becomes clear that one can't leave it at that. So, the assertion that rationalism banks on understanding and reason *only* and depreciates sense experience is simply misleading and is the fruit of empiricism's second strategy, i.e. rationalism-bashing. Dominik Perler, taking into account the importance of innate ideas in Descartes, comes straight to the point:

"*Here, one might once more proceed in an empiricist vein and argue as follows: we form an idea of a mathematical object, e.g. a triangle, by considering numerous triangles and abstracting precisely what they all have in common, namely a specific figure. But Descartes does not follow this argumentation. He claims that we form an idea of a triangle by grasping the 'nature or form or essence' of the triangle; and that we can do this even when there is not a single triangle existing outside ourselves.*"[271]

Perler then presents two arguments used by Descartes, in his fifth Mediation, to clarify this process:

"*Firstly, Descartes states that according to the theory of abstraction we can have ideas only of those mathematical objects that we have actually perceived by our senses and from which we have actually abstracted. But we are obviously capable of forming ideas also of mathematical objects (e.g. a chiliagon) that we have never seen. That is, we can grasp them by understanding their definition.*" (loc. cit.)

Perler then comes to the essential conclusion:

"*I thus recognize a triangle by understanding the definition 'a triangle is a geometrical figure the sum of the measures of the interior angles of which is always 180°'. No matter how many drawn triangles I may be shown, as long as I fail to grasp this definition I have not recognized the triangle.*" (loc. cit, p. 168)

And Perler also adds that since in empiricism and materialism the concept is supposed to be abstracted from the thing, Hobbes, for instance (in the third objection to the Meditations), simply couldn't believe how the triangle, if it wouldn't exist, was supposed to have a nature (loc. cit., p. 178). We will later, in the chapters on Locke and Hume, deal in detail with the essential errors of this apparent "abstraction" of concepts from sense experience.

Perler then quite rightly deals with the claim that ideas are generated by simple natures; which is quite sufficient for marking the contrast between the rationalistic model of knowledge and the EAN model. Then Perler, secondly, introduces the standard a priori argument that Descartes used to reject Gassendi's critique, namely that we must have innate con-

[271] Dominik Perler, René Descartes, München 2006, p. 167.

cepts, or ideas, by disposition in order to be at all able to bring an understandable order to the unstructured sense experiences:

"*We can determine properties and distinguish between them only if we have concepts that enable us to structure sense experiences. We need to have these concepts before we structure these sense experiences.*"

And, lastly, Perler introduces the argument we have already dealt with in our discussion of the idea of the circle, namely that the lines of geometrical figures can never be perfect and are always somewhat uneven or "frayed," which once again highlights that the figure, in its concept in itself, is always "only" a thought figure, even though intuition, or visual *intuitive evidence*, remains an indispensable source of information.

The insight itself, the "grasping" of an "insight" that is essential to rationalism can, in turn, of course not be directly "observed" or represented by technical means such as a formula or a computer chip – and this is precisely where (to return to the article in the Stanford Encyclopedia) the empiricist can hook in with his attack. The article defines rationalism, somewhat differing from Hans Jürgen Engfer's definition, by three theses:

1. "*The intuition/deduction thesis. Here, intuition is defined as a form of rational, and perhaps visual, insight: "Intellectually grasping a proposition, we just 'see' it to be true in such a way as to form a true, warranted belief. The nature of this intellectual 'seeing' needs explanation. Deduction is a process in which we derive conclusions from intuited premises through valid arguments, ones in which the conclusion must be true if the premises are true. We intuit, for example, that the number three is prime and that it is greater than two. We then deduce from this knowledge that there is a prime number greater than two. Intuition and deduction thus provide us with knowledge a priori, which is to say knowledge gained independently of sense experience.*"

This definition of *intuition* leads to a key question of rationalism as well as the visual turn and is of extreme relevance for my further argumentation. I will therefore go into it in some detail so as to reach full clarity on the concept, as used in the present context, of intuition or, as Descartes called it, *intuitive evidence*. The very well-chosen description refers to the following elements: firstly, the grasping of a proposition, that is, the *insight*, the grasping of simple knowledge. Given that a proposition is a linguistic presentation of knowledge, this might imply a certain limitation or channeling of the argument. Then: "we just see it to be true," that is, a form of direct recognition of a connection where seeing could be in part a metaphor, in part a term for actual visual thinking. "Intellectual seeing," then, is another description of this specific way of gaining insights. True to his methodological commitment to analytic linguistic philosophy, the author speaks of "propositions" and "valid arguments" but fails to consider that insight might actually be gained by means of a visual rather than language-based process and that there actually might be such a thing as

insight into functional relations that would already be a form of visual thinking rather than insight through sense experience. This is very important, and we will later again deal with this issue in our discussion of whether thinking without language is possible, what might be its scope, and whether there is a more to-the-point way of describing or defining this visual thinking. The mode of intuitus, *intuitive evidence* and *deduction* of course traces back to Descartes, the founder of modern rationalism. Evidence itself is again a concept that points to the visual element of thinking in the insight that Descartes describes as certain. Descartes, as is well-known, introduces the two ways or methods of gaining human knowledge in his "Rules for the Direction of the Mind." Starting out from the model of certain knowledge of "arithmetic and geometry," he seeks to devise a set of easily comprehensible rules that provide us with a method of gaining certain knowledge and steer clear of the deception that is potentially inherent in our sensory perception. In Rule III, § 5, he defines:

"*By 'intuition' I do not mean the fluctuating testimony of the senses or the deceptive judgement of the imagination as it botches things together, but the conception of a clear and attentive mind, which is so easy and distinct that there can be no room for doubt about what we are understanding. Alternatively, and this comes to the same thing, intuition is the indubitable conception of a clear and attentive mind which proceeds solely from the light of reason. Because it is simpler, it is more certain than deduction, though deduction, as we noted above, is not something a man can perform wrongly. Thus everybody can mentally intuit that he exists, that he is thinking, that a triangle is bounded by just three lines, and a sphere by a single surface, and the like.*"[272]

Here, Descartes quite clearly states what he understands by intuition: "*seeing by mental intuition*" or, reversely, understanding by seeing – a simple and instantaneous, almost "automatic" recognition of elementary relations and facts *that can be grasped in a single act*, e.g. that a triangle has three sides or that a sphere has only one surface. What is at once "projected, by seeing, into" the perceived figure, what is recognized in the perceived figure, is nothing to do with a mode of "empiricist immediacy" but due to a grasping that is visual and, nevertheless, thinking! It is of fundamental importance to clearly define this form of simplest knowledge as different from the "bad immediacy" of EAN and its illusory postulation of an immediate recognition of things-in-themselves by way of "mirroring" through sense experience. Extensively relying on the *Regulae*, Ernst Cassirer highlighted this essential difference as early as in his dissertation:

"*The certainty of the foundations is described by the term 'intuition'. Intuition, however, means – in contrast to the sensory grasping of a given – the free constitution of the*

[272] René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 14.

*object from the pure law of the understanding. The criterion of 'clearly and evidently' is another way of expressing this meaning; at least in those passages of the 'Rules' where the basic critical thought is most purely expressed.*"[273]

This, then, is about the constitution of an object by pure thinking, a grasping of relations that, in Descartes, rests on the innate insight of intuitive thinking, e.g. the grasping of the simplest relations in a geometrical figure, and does not belong to the domain of sense experience. If such a figure is considered from a different point of view, if for instance visual thinking focuses on the angles or the plane rather than the sides, other simple evidences or several such evidences are grasped while the way this geometrical figure is received from sense experience remains unchanged. So, if the frame of reference changes, or is "seen," intuited, from a different point of view and, thus, in a new way, other simple natures appear, and are grasped. From this, the creative element, novelty, emerges. Marcus Giaquinto has very appropriately expressed this as follows:

"*The creative heart of the discovery process lies in viewing a form in two ways at once: … a particular line segment was viewed as both a diagonal of one square and a side of another; a certain triangle was viewed both as half of one square and a quarter of another.*"[274]

In Rule 6, Descartes – to continue our reconstruction of rationalism – now offers a very clear definition of what he understands by intuitive insight by means of "*simple natures*": insight occurs 1. intuitively, that is, *by directly grasping a relation*, 2. *at once*, 3. *clearly* and 4. *distinctly* (I propose to call this *adequately differentiated*). So, what is grasped is not things but, in the things, relations, connections that 5. "*are the simplest and easiest of all*" and that allow us to recognize these things in their essence. Remarkably, except for the mode of "at once" that will interest him less in his later reflections, Descartes will retain the criteria of clearness and distinctness (adequately differentiated) even in his late creative period of the 1640s and, thus, never disavow this early formulation of his doctrine.

He does point out, however,

"*that there are very few pure and simple natures which we can intuit straight off and per se (independently of any others) either in our sensory experience or by means of a light innate within us.*"[275]

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273 Ernst Cassirer, Descartes Kritik der mathematischen und naturwissenschaftlichen Erkenntnis, Paderborn 2012 (1899), p. 7.

274 Marcus Giaquinto, Visual Thinking in Mathematics, Oxford University Press, Oxford 2007, p. 158.

275 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 22.

These *simple natures* at the same time describe the absolute structural certainty we are capable of in each cognitive act; which leads to complex considerations regarding Descartes' theory of truth and the certainty of knowledge in general, for the allegedly one hundred percent certainty, or absolute certainty, has, more often than not, later turned out to be wrong. The crucial point to be considered here is Descartes' reference to the *light of reason*, elsewhere also called the "*natural light*", that is, the dispositionally innate, pure reason of man and, more specifically for the considerations in the present book, the faculty of "*intuitively seeing with the understanding*." This clearly suggests that the mode of visual grasping, visual insight, also applies to the grasping of abstract ideas that, insofar as they are simple natures, is equally "effortless," quick and spontaneous. The exact definition of this *natural light*, however, has been and still is the subject of vast debates and varying interpretations.[276]

But considering his frequent use of the term, the definition of what Descartes understands by *natural light* seems relatively clear to me. The *simple natures* that are first (because they are fundamental and elementarily simple) grasped intuitively, immediately, in the occurring sensory data themselves, that is, "triggered," in a first step, by random sense experiences, are grasped by means of an *innate natural light* (pure understanding) without leaving the least doubt. From this it follows that the innate natural light is defined by its very power to grasp the *simple natures* and to rely on an *innate order* to logically arrange, configure and, finally, build a concept from the sense data. The defining feature of the activity of the natural light is the knowledge that is gained clearly and distinctly (has been adequately differentiated). "Clear" and "distinct" are Descartes' criteria of truth, defined as early as in his *Regulae* and never disavowed until his death. The innate, natural light may have other, more far-reaching functions in performing the sequential steps of deduction, but the simple natures as the relations that are easiest to grasp remain elementary, for without this grasping of the simpler connections and relations, no thinking and intuiting of the more complex ones would be possible.

In the *Regulae*, Descartes offers another remarkable description of these "simple natures" that the natural light allows us to know intuitively and accurately:

"*Fifthly, it is not possible for us ever to understand anything beyond those simple natures and a certain mixture or compounding of one with another. Indeed, it is often easier to attend at once to several mutually conjoint natures than to separate one of*

[276] See, for instance: John Morris, Descartes' Natural Light, Journal of the History of Philosophy 11, 2 (1973), pp. 169–87, or: Peter Schouls, Cartesian Certainty and the 'Natural Light', Australasian Journal of Philosophy 48, 1 (1970), pp. 116–7; and: Peter Schouls, The Imposition of Method, A Study of Descartes and Locke, Claren-don Press, Oxford (1980).

*them from the others. For example, I can have knowledge of a triangle, even though it has never occurred to me that this knowledge also involves knowledge of the angle, the line, the number three, shape, extension, etc. But this does not preclude our saying that the nature of a triangle is composed of these other natures and that they are better known than the triangle, for it is just these natures that we understand to be present in it. Perhaps there are many additional natures implicitly contained in the triangle which escape our notice, such as the size of the angles being equal to two right angels, the innumerable relations between the sides and the angles, the size of its surface area, etc."*[277]

What is interesting here is the remark that we can never "*understand anything beyond those simple natures and a certain mixture or compounding of one with another.*" This is very instructive and in line with the above explication, for with their strong focus on visual thinking these simple natures provide the foundation for cognition in general. They describe the minimal scope, as it were, that is needed for a thought to be able to mentally grasp proportions and relations and to logically understand a problem. Without this intuitive evidence, the mind could never find a first foothold in or access to a problem. This also follows from the remark that the triangle is logically constructed for us from this kind of simple natures, as far as we have intuited them, and that there may be other simple natures hidden in it that we have not yet seen, just as in chess a certain position that has not yet been fully analyzed may always comprise some better moves. Whatever relations may remain to be detected in this triangle, they will be found in a chain of simple natures. In Rule 6, Descartes goes on to reflect on the simple natures and our access to them, and it is fascinating to see him almost reach the heights of Hegelian dialectic:

"*The secret of this technique consists entirely in our attentively noting in all things that which is absolute in the highest degree. For some things are more absolute than others from one point of view, yet more relative from a different point of view. For example, the universal is more absolute than the particular, in virtue of its having a simpler nature, but it can also be said to be more relative than the particular in that it depends on particulars for its existence, etc.*"[278]

However, Descartes' mastering of the dialectic method of thinking that is foreshadowed here was intuitive only, so he had to fall back on the natural light that gives us certainty of simple natures in the particular case but did not further systematize the relations among these simple natures. A straight line or an angle is absolute from one point of view but relative or

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277 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 46.

278 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 22.

compounded from a different point of view. The point of view, then, that implies a second, novel perspective from which to consider the *simple nature* brings the crucial gain of knowledge, the new insight, the new knowledge. Therefore, the recognition of novelty is virtually always bound up with this new *insight*, this new *aspect*, this *new perspective* (visual terms, all of them) and does not result from the breakdown and analysis of what is already known. At this point, I suppose, Descartes' reflection on simple natures, on the doctrine of intuition and deduction, will have come to a standstill, realizing as he did that a further evaluation of how this change of perspective itself is happening was needed to comprehensively explicate the process of our thinking. Because such new perspectives, can only be posited by a spontaneous, creative, self-conscious mind that, in turn, needs some kind of guarantee. This may well have been the point that led on to the founding of the *ego cogito* in the Meditations and the growing emphasis on the role of the *will* in the "Principles"! Volition here is just another term for the positing of a *perspective*. This leads on to the concept of function, for function for the elements of a series logically follows from a *point of view*, as Cassirer would say, a point of view that is not simply "given" but is deliberately and consciously posited. Thus, a knife has a function that is comprised in the concept, but from a different perspective the knife can also be a bartering object, a cultic object or an ornamental object, which changes its function without changing its genuine cutting function as a knife. The concept of function is not falsified in the process but changes, due to a change in *perspective*, in terms of a new function.

But let's resume our account of rationalism from modern sources. Also with respect to the natural light, Deborah Boyle insists that active volition, along with "pure intellect," is an important component, thus marking her difference from John Morris' view who postulates the natural light as a faculty of the understanding: "*it simply gives a click of recognition when a true idea is brought before it,*" a quasi-automatic "click into place" in the mind's encounter with simple natures as soon as the latter are seen with the "eyes of the mind."[279] Based on considerations derived from gestalt theory that I will later go into in more detail, I also tend to assume "automatic" cognition on the visual, tactical level of these simplest insights. Abstract, complex considerations will surely require the active and creative operations of the mind and the positing of a perspective, but at the level of intuitive insight into the *simple natures* cognition seems to be a rather sudden occurrence, a "*click of understanding*". Another crucial point in Deborah Boyle's investigation is her suggestion that the "natural light" does not describe "insight" in general but logical, pure thinking that

[279] Deborah A. Boyle, Descartes on Innate Ideas, Continuum International Publishing Group, London/New York 2009, p. 86.

necessarily, by means of the simple natures, leads to clear and distinct (adequately differentiated) results. For further explication, Boyle quotes a proposition by Descartes from his Third Meditation where he differentiates between the immediate perception of and the rational insight into external things:

"*When I say 'Nature taught me to think this', all I mean is that a spontaneous impulse leads me to believe it, not that its truth has been revealed to me by some natural light. There is a big difference here. Whatever is revealed to me by the natural light – for example that from the fact that I am doubting it follows that I exist, and so on – cannot in any way be open to doubt. This is because there cannot be another faculty both as trustworthy as the natural light and also capable of showing me that such things are not true. But as for my natural impulses, I have often judged in the past that they were pushing me in the wrong direction when it was a question of choosing the good, and I do not see why I should place any greater confidence in them in other matters.*"[280]

Descartes here speaks of the natural light or the natural insight, which is the only one he trusts, as opposed to spontaneous habits and impulses. The way he explains it, this is presented as a natural faculty (which, therefore, from our modern point of view, has no need for legitimation by God) whose insight is beyond doubt and contrasts with the no less natural impulse to take the information received from sense experience at face value. With this, and for the purpose of this introductory chapter, the concept of natural light would seem to be sufficiently described.

This is also the place to throw some light on Descartes' criterion of truth, namely, the clear and distinct knowledge as exposed in the first rule of the *Discourse on the Method*.[281] As for the term of distinct, I feel, as already stated above, that the expression *adequately differentiated* would seem to be more accurate. Why Descartes did not develop a theory of truth of his own and why he makes do with the criteria of clear and distinct has been discussed at some length. A more explicit description of what he understands by these two terms is for the first time given as late as in his *Principles of Philosophy*:

"*I call a perception 'clear' when it is present and accessible to the attentive mind – just as we say that we see something clearly when it is present to the eyes' gaze and stimulates it with a sufficient degree of strength and accessibility. I call a perception 'distinct' if, as well as being clear, it is so sharply separated from all other perceptions that it contains within itself only what is clear. … For example, if someone feels an intense pain, the perception he has of it is indeed very clear, but is not always distinct. …*

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280 René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 26f.

281 René Descartes, Discourse on the Method, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 120.

*Hence a perception can be clear without being distinct, but not distinct without being clear.*"[282]

This definition is, of course, not without problems, for with respect to clarity, it refers to the very appearance that Descartes rejects as a source of truth, but perhaps this has been inadequately translated or inaccurately phrased. What is more helpful in this context is the example of pain, for the sensation of intense pain is unequivocally and unmistakably clear, even though it may not always be *adequately differentiated* and, thus, be attributed to the wrong organ. A typical example in the field of medicine is the myocardial infarction that is subjectively felt as a pain in the stomach. A pain is adequately differentiated when it is clear, that is, felt as an intense pain and so perfectly differentiated in its nature that other causes of pain can be excluded. A colicky pain in the right upper abdominal quadrant that spreads to the right shoulder but not to the right renal bed is, as far as this can be said without auxiliary means, a biliary colic. Detlef Mahnke sets us on the right track in this matter:

"*… a perception is clear if objects that are of a different nature are seen in their respective peculiarity and no effort is made to explain the one by the other. But no object presents itself at first sight with the required clarity. This is not because things are confusing in themselves so that, as a result, our cognition can also only consist of confused judgments. Rather, the reason lies in ourselves. (…) Distinction is the means of seeing things in their original purity.*"[283]

So, it is differentiating ascertainment – described, since Plato and Aristotle, as the essential activity of thinking – that helps us to unravel what is confused until all that is left in the object or problem at hand are clear elements only. This differentiation, however, is dependent on the essence of the object and its relations to other objects, for the perfectly differentiated, perfect grasp of the object in turn depends on these relations as far as the facts, given the critical limit, allow for it. In his work on Descartes, L.J. Beck offers a very good description:

"*The relation between the clearness and distinctness of ideas is that, whereas an idea may be clear without being distinct, a distinct idea is always a clear idea and an idea which is completely clear is always distinct. If an idea is only partially clear, it is because some of the elements essential to its clarity are missing, that is to say, it is confused in so far as these elements are absent. The confused idea is always necessarily an*

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[282] René Descartes, The Principles of Philosophy, in René Descartes, The Philosophi-cal Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 207f.

[283] Detlef Mahnke, Der Aufbau des philosophischen Wissens nach Descartes, München / Salzburg 1967, p. 37f.

*'incomplete idea' as opposed to the 'adequate idea', to use the terminology of Spinoza…*"[284]

So, Beck also proposes the concept of adequate differentiation that, in the process of cognition, closes in on the essence of the object or relation, or is closed in on by the object in its nature. It does not escape his attention that the definition of the criteria of truth implies a psychological element, as well, but then again the element of necessity it contains also conveys a logical and necessary property to the criterion. Similarly, Alan Gewirth, author of the perhaps best-known interpretation of Descartes' understanding of clearness and distinctness, notes:

"*The minimum requirement for an idea to be clear, then, is that whichever content be taken as basic, the other include what in the Replies is called the formal nature (ratio formalis) of its object, and what in the principles is called the object's 'leading property, which constitutes its nature and essence'. (…) Similarly the minimum requirement for an idea to be distinct is that nothing contradictory to the essence of its object be included in it; it is in this sense that Descartes defines a distinct idea as one which 'contains nothing other than what is clear'.*"[285]

Relying on differentiating identification and clearness and starting out from the simple natures, everything that is "alien" to the complex essence or structure of the object is eliminated in view of this essence until it is clear and distinct for us. Thus, Gewirth's conclusion regarding the psychological component, whose presence he acknowledges, is as follows: it is precisely because the mind, when exploring a problem by means of thinking, cannot but take the very steps that lead to the essence, that is, rely on the simple natures for its methodical advance. Thus, there is no need at all for a theory of truth that, for Descartes, would always have been nothing but a tautological alibi. For *if* we lacked this initial, direct faculty of grasping the simple natures, the simplest relations, nobody would ever be able to know anything because we would be clueless from the very start, the simplest step, the simplest element. Dominik Perler very stringently resumes:

"*Ideas are clear and distinct precisely when they present only the essential properties of an object. To identify these essential properties we need to determine which are the properties without which the object could not be grasped at all. And to do this, we need to clarify what the concept of an object comprises.*"[286]

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284 L.J. Beck, The Method of Descartes, The Clarendon Press, Oxford 1952, p. 59f.

285 Alan Gewirth, Clearness and Distinctness in Descartes, in: Descartes – A Collection of Critical Essays, Willis Doney (Ed.), University of Notre Dame, London 1967, p. 261ff.

286 Dominik Perler, Repräsentation bei Descartes, Frankfurt / Main 1996, p. 282.

But Perler is also acutely aware of the fact (which he demonstrates using the famous ball-of-wax example Descartes devises in the Meditations) that any investigation focusing on or working to reveal the essential structure of an object will result in something like a logical circle because in the cognitive process, we need to orient the steps of our reasoning to this essence in order to understand the *function* of the object and its multiple relations, on the one hand, while we can have no knowledge of this function and these relations at the beginning of this process, on the other. This is true, of course. But what most commentators fail to take into account is that Descartes' starting point is the innate "natural light" and its adequate step-by-step grasping of the *simple natures*, and that it is the essential function of this natural light to be able to adequately identify them. The simple natures, in turn, can only be in harmony with, or elements of, the essence of the object because the latter, too, can ultimately not be alien to the natural light if our grasping of the particular simple natures has been correct. If each step of an equation or a complex function has been correctly solved and properly grasped, the equation or function in its essence cannot lead to a wrong result. And, inversely, if we could not start out from somewhere, if we did not have some anchor points, however elementary or primitive, for reasoning to hold on to we would truly be in a dead end, an irresolvable circle, epistemologically speaking. That the intuitive grasping of the simple natures is possible at all highlights the fact, from the perspective of a rationalistic Neo-Kantianism, that these innate, simplest mental operations correspond to a domain where seeing and thinking "merged" in the course of those long epochs where pre-linguistic thinking had to guide the simplest practical purposive-rational activities and considerations.

Due to its modern connotation, the term of *intuition* implies overtones of inspiration and "gut feeling," which is precisely what Descartes did not have in mind. L.J. Beck has noted this problem, emphasizing the link to visual thinking:

"*The real meaning of Descartes might perhaps be more adequately conveyed … by the use of some such phrases as 'immediate apprehension', 'intellectual insight' or 'intellectual vision'. Descartes himself chose on one occasion 'la lumière naturelle'…*" *and* "*… does not restrict himself to the word intuitus, but uses indifferently visio, lumen naturale, simplex mentis inspection, and other terms as synonymous and equally apt to describe the first fundamental function of the vis cognescens.*"[287]

Beck goes on to very lucidly explain the function of intuition with respect to Descartes' truth theory:

[287] L.J. Beck, The Method of Descartes, The Clarendon Press, Oxford 1952, p. 50.

"*Intellectual intuition, on the other hand, is a purely spiritual activity, an activity of the understanding alone, exercised on a special kind of object. It is an intellectual 'seeing', a visio, and has a certainty peculiar to itself. To see intellectually, to intuit the truth, to see, for instance, that self–consciousness and existence are necessarily implied in each other, is to see once for all in a manner which leaves no room for change of view or doubt of any kind. To intuit a truth is to know that truth with absolute certainty and infallible assurance, and this certainty and assurance spring positively from the very nature of the mind itself, the natural light of reason.*"[288]

Besides giving a very good summary of the terms used in this respect by Descartes, this of course also very clearly shows that all of these terms belong to the "realm" of the visual turn. For Descartes, *intuitive evidence* occurs suddenly, with indubitable clarity and unambiguity, while deduction is a step-by-step sequence of logical operations – that is, not something that occurs "at once" (!) – that he distinguishes from direct intuition "*on the grounds that we are aware of a movement or a sort of sequence in the latter but not in the former*" and that "*deduction in a sense gets its certainty from memory.*"[289] Norman Kemp Smith describes the relation between deduction and intuition as follows:

"*Deduction, then, is not the source of a special kind of knowledge, but simply the process by which intuition extends itself so as to take in what at first appears to exceed its grasp. Thereby intuition shows itself to be not an isolated act, but a growing capacity of mind for truth, each new truth serving as an instrument in the discovery of others.*"[290]

A.C. Ewing has shown very clearly why we need intuitive insight ("seeing something to be true") in order to be at all capable of deductive operations:

"*In order to conduct a valid deductive argument we must see that each step in the argument follows logically from the preceding one. To argue – a, therefore b; b, therefore c; c, therefore d, we must see that b follows from a, c from b, and d from c. But how can the fact that b follows from a, be itself established by reasoning if we understand by that mediate reasoning? Only by interpolating another stage, e.*"[291]

For if the interpolation of yet another intermediate step was needed for us to get from insight a to insight b, the result would be an endless regress of intermediate steps. Therefore we need at one point to be able to intuitively

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288 L.J. Beck, The Method of Descartes, The Clarendon Press, Oxford 1952, p. 53.

289 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 15.

290 Norman Kemp Smith, New Studies in the Philosophy of Descartes, London 1952, p. 71.

291 A.C. Ewing, Reason and Intuition, Proceedings of the British Academy, Vol. XXVII, London 1941, p. 8f.

perform the logical transition, the leap, the step, the transgression, to have the insight: Aha! – for otherwise, if we were unable to do the leap, have the sudden insight, we would actually never be able to perform this step but instead get trapped, due to the constant interpolation of intermediate steps, in the above-mentioned logical regress; which, incidentally, raises the question where these intermediate steps themselves are supposed to come from.

This can best be illustrated by a mathematical equation. We are confronted with a long equation whose final result we cannot know *at once*, *clearly* and *distinctly*. So we cancel, transform and reduce its elements step by step until, at the end, there is the result: x = 5. This result cannot be reduced any more, we just recognize, or must be able to recognize, that the value to be determined is satisfied by the number 5 and that 5 corresponds to the value x, that both are *identical*. That's all there is to this equation, but for grasping it we need the "natural light," the innate faculty to think numbers as unities, the innate faculty to understand and apply *equality* in itself (see Plato, The Republic, 523–525) and the faculty to hypothetically posit one thing for another, that is, to hypothetically posit the unknown x and, in addition, to understand that x is completely identical with 5, completely fulfilled by 5, and vice versa. This is something we must have *a priori*, but we cannot further simplify the insight that the number five equals the x to be determined, x = 5, nor is this fact the result of step-by-step reasoning – the understanding must grasp this intuitively, *at once*, instantly – Aha! Somewhere along the line a teacher or a fellow student explains the *function* of a variable, and once we have understood it, in one act – Aha! –, we are able to handle unknown variables. But this, then, holds for every step of the transformation of the equation that has led to this result. The same is true for chess problems. You explore the variations step by step, deductively, but that the decisive move happens at a stroke (as Wittgenstein might say: "*It is as if we could grasp the whole use of the word at a stroke*", Philosophical Investigations § 191) because it will open up lines of action and at the same time allow you to give a check, etc., is something you suddenly "see" or, more to the point, think visually. If you were unable to do this, you would never be able to access even the simplest, most elementary relations and facts and, therefore, to "access" the world. For all complex functions and relations can be further reduced by perseverant thinking, but the most elementary insights must be intuitively grasped, must be "seen" as evident by the understanding, or else we would never be able to find a starting point from which to proceed to the step-by-step investigation of the structural fabric of the world – this is Descartes' seminal thought.

Reducing the equation, we notice that each single step, too, requires us to "see" = think the terms that are to be singled out and reduced (of

course we also need the innate faculty of thinking equality in order to perform the same operations on both sides of the equation, so the equation is kept in balance during all transformations). Yet the individual steps of the transformation will be performed according to a deductive method, more or less in the manner of logical operations (if – then; or; not; if and only if, etc.), thus differing from the simple intuitive evidence: x = 5, Aha!. Interestingly, it is John Locke, of all people, who in the second chapter of the fourth book of his Essay not only acknowledges the mode of intuition but emphatically accentuates and affirms it, and does so in a style that, firstly, might be that of Descartes and, what is more, perfectly prepares the ground for the visual turn:

"*And this, I think, we may call* intuitive knowledge. *For in this, the mind is in no pains of proving or examining, but* perceives the truth, *as the eye does light, only by being directed toward it* (just as in Descartes). *Thus the mind perceives that white is not black, that a circle is not a triangle, that three are more than two, and equal to one and two* (as in Descartes whose example was: 1 + 3 = 2 + 2). *Such kind of truth,* the mind perceives at the first sight *of the ideas together, by bare intuition, without the intervention of any other idea; and this kind of knowledge is the* clearest, *and* most certain, *that humane frailty is capable of. This part of knowledge is irresistible, and like the bright sunshine, forces itself immediately to be perceived, as soon as ever the mind turns its view that way; and leaves no room for hesitation, doubt, or examination, but the mind is presently filled with the* clear light *of it. 'Tis on this intuition, that depends all the certainty and evidence of all our knowledge, which certainty every one finds to be so great, that he cannot imagine, and therefore not require a greater: …*"[292] (my emphases and commentaries, WW)

This jewel penned by John Locke substantially supports a core thesis of rationalism and the visual turn, i.e. that the act of thinking always already involves the pre-existing faculty of rational insight, *intuitive evidence*. Strikingly, reference is made to the mode, epistemologically defined by Descartes, of intuition that is marked by clearness (and, not referred to by Locke at this point, distinctness (adequately differentiated)), which would in addition suggest the concept of function (that Locke, being a nominalist, ignores), and to a numerical example reminiscent of Descartes. What is much more important, however, is the way the ground is, here, prepared for the visual turn: although Locke clearly refers to a mode of cognition and an ideational process, he uses metaphors – perceiving the truth *"as the eye does light," "at the first sight," "bright sunshine," "the mind turns its view that way"* – that clearly suggest a visual rather than abstract act of cognition. This cognition leaves *"no room for hesitation, doubt,"* it is absolutely certain of its grasp and, thus, equivalent to the absolute intuition of clear and adequately differentiated relations as set forth by Descartes. And,

[292] John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, IV ii, p. 337.

from the point of view of time, the mind is "presently," suddenly, *"filled with the clear light of it,"* just as in Descartes' metaphor of the "natural light." It is really gratifying to see John Locke adopt one-to-one the essential insights first described by the "villain" Descartes, fifty years before!

From this great insight of Locke's we can, in a first step, retain: *intuitive evidence* results in a sudden insight where an elementary relation, that is, two facts, are seen as one and are clearly and adequately differentiated and, thus, identified with the greatest possible certainty. I have highlighted "elementary" in this context, for this ultra-fast, intuitive-visual insight closely resembles the so-called Aha! experience or Eureka factor that was described in psychology by Karl Bühler. Interestingly, Bühler's examination of the phenomenon was in part done in the context of problem solving with respect to geometrical figures; however, a more in-depth exploration of the relations that are of interest here would go beyond the scope of the present book.[293] The Aha! experience, too, describes this kind of apparently unambiguous and clear sudden insight that is accompanied by a feeling of pleasure and, conceivably, based on biological patterns not unlike those involved in the epistemological definition of intuition in philosophy (even though Bühler's concern here is more with the way someone may suddenly, in a flash, intuit the solution to a more or less complex problem that already has a long history of failed attempts at solution). Well-known examples of Aha! moments are Archimedes' Eureka!, Alexander Fleming's discovery of penicillin, or the researcher August Kekulé who, as legend will have it, discovered the structure of the benzene ring after having a dream of a snake seizing its own tail.[294] Interestingly, the solution in these cases is visual in nature, just as there is a visual dynamic in the figurative language of dreams and their symbolism. What is at stake in the cognitive mode of intuition described by Descartes as well as Locke, however, is the intuitive evidence of the simplest, most elementary relations that Locke, quite rightly, illustrates by saying that white is not black and that a circle is not a triangle! In a previous passage he also refers to "self-evidence" as a mode of cognition, albeit with a stronger focus on abstract insights:

"*Universal and ready assent, upon hearing and understanding the terms, is (I grant) a mark of self-evidence: but self-evidence, depending not on innate impressions, but on*

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293 Karl Bühler, Tatsachen und Probleme zu einer Psychologie der Denkvorgänge. Über Gedanken. Archiv für die gesamte Psychologie 1907, 9. Karl Bühler, Theory of Language (1934), John Benjamins B.V. 1990, p. 353: "I once looked for a term in psychology for a specific experience familiar to all of us and called it tersely *aha-experience*; the name has now become current in psychology."

294 Sascha Topolinski, Rolf Reber, Gaining insight into the "Aha" experience, Current Directions in Psychological Science 2010, 19(6), 402–405.

*something else … belongs to several propositions, which no body was yet so extravagant, as to pretend to be innate.*"[295]

Along with the fact that "evidence" is again a visual metaphor, John Locke, the founding father of empiricism, once more acknowledges the intuitive self-evidence set forth by Descartes. On the other hand, he vehemently rejects the innate principles and ideas that would allow us to have this effortless self-evidence, in the first place. Fraser, too, emphasizes that in Locke, this intuitive knowledge must on no account be taken as an acknowledgement of innate principles:

"*The 'innate principles' against which the 'Essay' wages war are not the assumptions which are thus (by degrees) seen by growing reason to be either self–evident or demonstrable… Thus even amidst the negative arguments of the first book, he appeals to intuitive reason, – under the name of 'common sense', – on behalf of the self–evidence of one of the very 'principles' against the 'innateness' of which he was arguing.*"[296]

Fraser makes it quite clear that man's elementary faculty of reason, posited by Descartes as the *natural light* given to us by nature and enabling us to have an intuitive insight into the simple natures, is to be conceived of as innate whereas common sense in Locke's philosophy is certainly comparable at a functional level but is not explicitly addressed as innate and needs to be built over time from sense experience. How this is supposed to be achieved from *sense experience* alone, without evolutionarily developed cognitive structures and on the basis of an empty and unstructured "tabula rasa," "blank slate," will be discussed in the chapter on empiricism. From a biological perspective, it would be very strange – if not downright spooky – if the very faculty of thought and the thought structures, of all things, lacked a genetically pre-structured neurological basis and had to be time and again built from scratch and exclusively from sense experience. An absurd concept, actually. But even David Hume, the "shining light" of EAN, undeniably acknowledges intuition as a mode of cognition. In his famous "Treatise of Human Nature" he invokes the four most important relations of thinking (when it comes to concretely describing thought processes the English empiricists, unlike Kant and Hegel, prefer to keep a low profile and remain rather vague) that "can be the objects of knowledge and certainty," namely "resemblance, contrariety, quality and proportions in quantity or number":

"*Three of these relations are discoverable at first sight, and fall more properly under the province of intuition than demonstration. When any objects resemble each other, the resemblance will at first strike the eye, or rather the mind; and seldom require a*

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[295] John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, I i, 18, p. 25.

[296] Alexander Campbell Fraser, Locke, Edinburgh 1890 (reprint 2012) p. 116.

*second examination." He similarly observes that with respect to numbers we "might at one view observe a superiority or inferiority betwixt any numbers, or figures; especially when the difference is very great and remarkable."*[297]

Regarding the conflict between empiricism and rationalism it is important to highlight the two passages where Locke and Hume not only methodologically substantiate *intuition* but also clearly address it in a visual context. Both founding fathers of empiricism not only quite emphatically acknowledge and affirm the function of intuition but even describe it as a form of cognition that at once imposes itself. Moreover, unlike what is sometimes maintained in EAN writings, intuitive insight not only relates to abstract relations but very concretely, in Hume, to the perception of objects and, in Locke, to primary ideas. For in the above passage, Hume quite plainly says: "*When any objects resemble each other…,*" while Locke in the previous quotation states that *"white is not black."* As a consequence, we can note that the mode of intuition was adopted or at least accepted by Locke and Hume just in the way it was described and defined by Descartes. Given the dogmatic stance of some empiricists, these passages may have been overlooked, or deemed negligible. At any rate, we can summarize the basic self-conception of rationalism to the effect that the process of cognition starts out from sense experience as an indispensable but potentially unreliable, unclear and confusing source of information, but grasps the simple natures by intuitive evidence based on the innate "natural light" and, thus, organizes sense experiences in terms of relations and meaningful structures. Deduction, then, intervenes to connect the simple natures, build ordered and logically consistent chains of relations and systematically unfold knowledge. This was the first ingenious step that allowed Descartes to establish the mode of cognition of modern rationalism in the *Regulae* and the *Discourse* before further founding it by his second ingenious step, the "cogito," the subjective-objective insight of the subject, the ego. This self-aware ego, then, was the basis, if somewhat modified, for Kant to build the "headstone" of his architectonic system, i.e. the *transcendental apperception*, standing and permanent self-consciousness.

At this point of my account of the rationalistic mode of "intuitive evidence," contrasting it with Immanuel Kant's point of view seems to be in order. After all, Descartes transcends the "critical limit" defined in the Critique of Pure Reason, on the one hand, but, on the other, does not "discard" intuition for a pure doctrine of ideas but connects both elements, intuition and pure understanding, in a way that allows the understanding to assert its prevalence through intuition because both are "con-

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[297] David Hume, A Treatise of Human Nature, Penguin Classics, Penguin Books 1985, I, 3, I, p. 118.

nate." Kant approaches this issue along the lines of Leibniz' concept of "intellectus intuitivus" or "intellectus archetypicus," that is, the mode of cognition that is attributed to God. This form of cognition, as spelled out by Kant in the transcendental analytic, is not a discursive process, that is, not linked to cognition by the efforts of concept building, but a spontaneous grasping of the entire reality in its true totality by intuition alone. It is conceived as a model, as it were, of the comprehensive, perfect, penetrating cognition that is God's when he is looking at the sun, for instance – grasping the totality of all its quantitative and qualitative elements, particularities, processes and functions at a glance and without recourse to discursive thinking, grasping the thing-in-itself with the certainty of absolute knowledge. This is contrasted, by Kant, with the limited and "merely" discursive understanding of man that depends on intuition (Anschauung) and, building on it, must struggle along, under the guidance of experience, in a conceptual-discursive manner (as set forth by Kant in the *Critique of Pure Reason* and the *Critique of the Power of Judgment*).

As it is, this would seem to suggest a fundamental difference between Descartes' *intuitive evidence* of the *simple natures* and Kant's doctrine, i.e. that sense experience obtained by intuition is the starting point for the transcendental process of synthesis that enables us to conceptually structure and penetrate them. Which, in turn, is the very point that has the proponents of Neo-Kantianism engage in various efforts at further elaboration. Thus Hermann Cohen, in his progress toward "pure cognition," increasingly engaged in a sweeping epistemic rejection of intuitive thinking and sense experience and a gradual repositioning away from Kant and closer to Plato. Helmut Holzhey notes that in Cohen, there was

"*… an ever-intensifying polemic against any assumption of a sensorial 'given'. … Plato, Descartes and Leibniz are now seen as the leaders of philosophy, with Kant in need of alignment.*"[298]

In this respect, harmonizing Descartes' intuitive evidence of the simple natures with this dissociation from the given seems anything but easy. But Kant is actually quite close to Descartes' reasoning. In Descartes, the simplest facts and relations that are conform to the understanding are grasped at a glance, in what is open to intuition, it is true, but only – and that's the difference – because the *innate "natural light"* enables us to do so. On the other hand, in the field of geometry, Kant is well aware that pure intuition involves construction, that in spite of being an imaginative process, it is a logical construction after all. The kind of visual thinking I'd like to propose would, however, add yet another component to Kant that, I believe, can take the edge off the *sharp dualism* of intuition and concept and transform it, by the interpolation of imagination (Einbildungskraft)

[298] Helmut Holzhey, Cohen und Natorp, Basel / Stuttgart 1986, p. 146.

and schematism, into a continuous transition. Visual thinking, then, would be the very component capable of "harmonizing" Descartes' and Kant's theories of cognition and, at the same time, would make Kant's theory of cognition more consistent and less polar in its basic conception. Considering the concept of intuitive evidence as used by, for instance, Poincaré in the context of mathematics, geometry and logic it is evident that Poincaré, although he is generally described as a Kantian and relies on Kant in his terminology and style, actually uses a concept of intuition that is much closer to Descartes' way of thinking. So, at this epistemological level between Descartes and Kant, there still is room for further reflection.

However, to return to our main issue, unlike the mode of intuitive evidence that is referred to also in Locke and Hume, the debate about innate principles and ideas is a definite field of conflict between rationalism and empiricism and will be addressed below in the respective chapter. For the time being, it also brings us to the next important thesis.

2. The second thesis of rationalism is described as the "innate knowledge thesis" in the Stanford Encyclopedia. This is in line with Engfer's definition and is quite indisputably one of rationalism's central insights.

The Stanford article reads as follows:

"*The Innate Knowledge thesis offers our rational nature. Our innate knowledge is not learned through either sense experience or intuition and deduction; it is just part of our nature. Experiences may trigger a process by which we bring this knowledge to consciousness, but the experiences do not provide us with the knowledge itself. It has in some way been with us all along. According to some rationalists, we gained the knowledge in an earlier existence. According to others, God provided us with it at creation. Still others say it is part of our nature through natural selection.*"[299]

So, the assumption of innate knowledge that is part of our evolutionarily acquired, biological-cultural makeup is described, quite correctly, as a cornerstone of rationalism and, more particularly, rationalistic Neo-Kantianism. This fundamental understanding is diametrically opposed to empiricism, and John Locke famously dedicated the first of the four books of his "Essay Concerning Human Understanding" to a forceful "war" against innate principles and ideas. In the above quotation, the last sentences are particularly important, noting as they do that in early rationalism this knowledge was supposed to stem from an earlier existence (in this case, Plato's explanation by reincarnation) or to be part of our God-given makeup (Descartes) and, finally, that it might be a product of natural selection. Two points clearly emerge from this: firstly, that the

[299] Markie, Peter, "Rationalism vs. Empiricism," The Stanford Encyclopedia of Philosophy (Fall 2017 Edition), Edward N. Zalta (ed.), forthcoming URL = <https://plato.stanford.edu/archives/fall2017/entries/rationalism-empiricism/>.

empiricists are quite comfortable with keeping alive Plato's and Descartes' explanatory models since this enables them to discredit and shrug off the – objectively correct – approach of innate knowledge as mythical or religious and, at any rate, not scientifically founded. This procedure is a recurrent feature although a normal reaction today would be to rely on the also-mentioned theory of evolution rather than on mythical explanations. Would any student of philosophy today subscribe to a current whose central epistemological doctrine is based on the myth of reincarnation? Phooey! So, better stick to "experience"!

Since due to historical constellations, rationalism has not been brought up to date, and since Kant remains vague as to whether the a priori might be understood as innate (but, based on various propositions, I will later show that Kant in some way and to a certain degree accepts innateness but keeps a low profile in this respect and is, in addition, often inaccurately quoted), this determent tactic can for a certain time be quite fruitful. Secondly, what quickly becomes apparent is the intention and relevance of a rationalistic Neo-Kantianism, for there is more and more scientific evidence that our thought structures are the result of biological-cultural evolutionary development, and especially modern science provides evidence, on an almost yearly basis, for ever more faculties to be innate. *Rationalistic Neo-Kantianism takes up Plato's, Descartes' and Kant's intelligent and convincing approaches and arguments, disassociates them from their mythical and religious explanatory models and grounds them in the very convincing foundations of modern science*. This is the very constellation against which empiricism as well as all the successor movements of EAN will be unable to hold their own. At any rate, what needs to be referred to in this context is the mode of "a priori," the "synthetic a priori judgments" in Kantian terms, even though it must not be directly confounded with the concept of innate knowledge. What principally remains the same in all this is the logical core of the argument – that sense experience is a "rhapsody of perceptions" (Kant) and, as such, simply insufficient as the sole basis for gaining certain knowledge; that one needs to have prior knowledge as a prerequisite for cognition (Plato); and that one always already needs to have the natural light (Descartes) in order to be at all able to grasp the most elementary relations.

3. The Stanford article then addresses the "innate concepts" thesis

that will be dealt with in the third section of this book. Basically, it is not about specific concepts or concrete ideas being innate but about a structural disposition to discover or generate them. Noam Chomsky, for instance, was able to very clearly demonstrate that the *deep structure* of all known languages, i.e. *universal grammar*, is innate while individual words or concepts are not. The concept "roundabout" is certainly not innate, but

the understanding of function with respect to a circle, the ability to think a center, an axis and something rotating around this axis, may well be. What about the concept of identity? Can similarity be read off and abstracted from sense data without a pre-existing idea of similarity? Can there be measuring without a measure? This is most unlikely. From what has been said up to now one would also expect that innate knowledge and innate principles are deducible from visual thinking and the relations that can be grasped by it, rather than found in abstract concepts. Today, however, there is robust evidence that the concepts of the numbers one, two and three are innate, albeit as visual values on a number line, i.e. as functions, rather than as concepts in terms of numerals. What is innate is the functional capacity, the faculty to distinguish 1, 2 and 3, understand them as units and apply them to animals or objects.[300] In this sense, these concepts of number are innate. But more on this later.

4. The last significant trait invoked by the Stanford article is the rationalistic belief in the "superiority of reason":

That gaining knowledge through rational thinking which starts out from the intuitive insight of the innate "natural light" and proceeds by deduction and conclusion is superior to gaining knowledge through large or highly developed sense organs seems to be obvious. In the confrontation with all species, homo sapiens is living proof that knowledge is power and more intelligent beings are able to assert themselves against beings that are much stronger and endowed with much more highly developed sense organs. Reliance on reason as the supreme authority, guideline, compass is a central trait of rationalism, its logical counterpart being the rejection of irrationalism, fundamentalism, manipulation, dogmatism, ignorance, relativism, skepticism, confusion, injustice, romanticism and unfounded claims to power, but also anarchy.

While the above gives a rough outline of the essential elements and starting points of the two hostile philosophical doctrines, the multiple differences and nuances within each of these currents must not be overlooked. Within empiricism, a case in point would be George Berkeley, for instance, whose solipsism ("Esse est percipi") could be a possible consequence of the basic empiricist criterion of sense experience but is actually a movement away from classical empiricism and towards subjective idealism. We have seen that Berkeley's skepticism regarding the "real world" outside us was a major point of dissent for both G.E. Moore and Russell. But other authors do see Berkeley as one of the "big three of empiricism." In the field of rationalism, Karl Popper comes to mind whose Critical Rationalism was actually developed in the context of the Vienna Circle

[300] Stanislas Dehaene, The Number Sense, How the Mind Creates Mathematics, Oxford University Press 2011 (1997).

but is at the same time close to the theory of evolution and naturalism while seeking to dissociate itself from positivism by its criterion of *falsification*, among other things. Rationalism in Popper is opposed to irrationalism rather than a continuation of classical rationalism. However, I feel that focusing on the key differences helps to get a clearer idea of the major lines.

## Rationalism

In the following, I will try to offer an up-to-date reconstruction of classical rationalism that will enable us to ascertain whether it really is this objectionable, ridiculous and toxic monster, "relegated once and for all to the philosophical attic of the 17th century" (W. Stegmüller), My aim is to give an account of the essential and valuable defining elements of rationalism, freeing them from distortions and historical contingencies and, thus, allowing for a clearer view of both the actual attractiveness of the rationalistic doctrine and its synergies with the insights of modern scientific research; which, in turn, may also serve to reinforce and re-emphasize the rationalistic elements in Kant's philosophy.

In his acclaimed book, "Rationalism," John Cottingham offers the following introductory attempt at definition:

"*Rationalism in its restricted and technical sense is* invariably contrasted with empiricism*, and although this distinction needs to be made with care if oversimplification is to be avoided, it remains a useful and indeed unavoidable starting point for any discussion of rationalist philosophy. Empiricism, from the Greek empeiria (experience) is a thesis about the nature and origins of human knowledge; there are many variations and distinct formulations, but essentially the claim is that all human knowledge derives ultimately from sensory experience. Rationalists, by contrast, stress the role played by* reason *as opposed to the senses in the acquisition of knowledge. Some rationalists condemn the senses as an inherently suspect and unreliable basis for knowledge claims; others, while conceding that sensory experience is in some sense necessary for the development of human knowledge, nevertheless insist* that it can never be sufficient by itself. *All rationalists characteristically maintain the possibility of* a priori knowledge*.…rationalists make the striking claim that by the* light of reason *we can,* independently of experience*, come to know certain important and substantive truths about reality, about the nature of the human mind and about the nature of the universe and what it contains.*"[301] (my emphases, WW).

On the whole, this seems to be a stringent and accurate summary. Cottingham first emphasizes that notwithstanding the risk of oversimplification, the conflict between rationalism and empiricism is real and inevitable. He then addresses the basic criterion of empiricism that all our

[301] John Cottingham, Rationalism, Paladin Books, London 1984, p. 6f.

knowledge is supposed to derive from sensory experience alone, from the sensations we receive. In this radical form, the criterion was first, and famously, established by John Locke:

"*Let us then suppose the mind to be, as we say, white paper, void of all characters, without any ideas; how comes it to be furnished? Whence comes it by that vast store, which the busy and boundless fancy of man has painted on it, with an almost endless variety? Whence has it all the materials of reason and knowledge? To this I answer, in one word, from experience: in that, all our knowledge is founded; and from that it ultimately derives it self. Our observation employed either about external, sensible objects; or about the internal operations of our minds, perceived and reflected on by our selves, is that, which supplies our understandings with all the materials of thinking. These two are the fountains of knowledge, from whence all the ideas we have, or can naturally have, do spring.*"[302]

Although similar thoughts can already be found earlier in the writings of Francis Bacon and Thomas Hobbes, this passage presents the clearest wording of the *fundamental idea* of *empiricism*.

Rationalism, in contrast, argues that this empiricist basis, that is, sense experiences that are passively received from the external world, is simply too poor and too unstructured to ever allow for the generation of (certain) knowledge. It is simply not true – as even the above passage from Cottingham would seem to suggest – that rationalists condemn sense experiences for being too elusive and inadequate. This is beside the point, for "sense experience" or, to be more accurate, the processing and organization of these physical sensations by our perception-based cognition is the very outcome of the workings of the respective organs and brain structures in the course of man's evolutionary development. After all, it can't be denied, and is immediately evident, that without our five senses and the permanent processing and structuring of sense data we would be completely helpless. The crucial point, however, and the one on which rationalists keep insisting is that the information received from the senses, that is, sense experience *alone* is simply insufficient as a guarantee for general and certain knowledge. This is why Descartes notes:

"*Now there is in me a passive faculty of sensory perception, that is, a faculty for receiving and recognizing the ideas of sensible objects; but I could not make use of it unless there was also an active faculty … which produced or brought about these ideas.*"[303]

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302 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II i 2, p. 54.

303 René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 55.

Thus, someone who has never before seen a chessboard with chessmen on it will hardly be able to engage in the logical reasoning required for the game of chess, for instance. This is undoubtedly true, and in this sense the empiricists are, of course, right. But, on the other hand, if you lacked the required knowledge and capability of strategic thinking you could spend many a year observing a position on the chessboard from any number of perspectives, receive all the *sense experiences* imaginable or examine the board or the chessmen and yet never be able to think a single complex move. So what, then, is the decisive factor in chess? Is it whether the chessmen are made of wood or of metal, or is it their specific color scheme, or isn't it, rather, the logical sequence of moves performed with the figures that are right now sitting on the chessboard, unable to move on their own? The same is true for the many situations of everyday life: a marketing strategy, a computer program, a business plan, an electrician's circuit diagram, the pros and cons of a financial transaction – how much *sense experience* is involved in our assessment and consideration of these things, in our weighing a problem from every angle and to our best advantage, in short, in the mastering of our lives? Here the empiricist will object that what is at issue is statements about concrete things rather than what is called "reasoning," since the latter is supposed to be based on the operations of the mind and, therefore, inaccessible to observation by the senses. But aren't concrete things, too, grasped through their *function* rather than surface appearance? In terms of sense experience, a modem is a small silver box, but does this tell us anything about its function? The sense experiences that keep streaming into our sense organs, and the inner sense, that is, the thought fragments and emotions that keep surging in us are too chaotic and indistinct to enable a logical apprehension of reality, convey certainty, and structure thoughts. And unlike the recurrent stereotype, this insight does in no way play down the importance of the workings of the senses and their role as a source of information in rationalism. What it does, however, is presuppose an additional synthesizing and structuring element in terms of certain a priori functions we are endowed with.

Now, these reflections cast some light on the contrasting understanding, in rationalism and empiricism, of the role of the concept. In rationalism, which assumes the existence of dispositionally innate thought structures in certain fundamental domains, the concept is the systematic *synthesis* of the essential *functional* relations of a thing or a relation; in EAN, in contrast, it is a name that will be assigned like a name tag to the passively given sense experiences. Empiricist doctrine holds that we passively receive the sense experiences that are thrust upon us by the thing perceived. Then the understanding, of which we do not know with any precision what it really does and which is rather conceived as a simple combinatorial capacity, sets in to retrospectively combine these passively

registered ideas in the manner of a modular assembly system and assign a name to each thing, producing universality in the process. In his seminal work "Substance and Function," Ernst Cassirer already highlighted these fundamentally differing views of rationalism and empiricism. It has been suggested that this book was also written in response to Frege's concept of function (more on this later). But Frege's concept was derived from the mathematical process of forming a one-argument function and based on the mathematical conception of function and, thus, fails to capture the nature and dynamics of the actual thought process, that is, how we access the object, how we really assign the concept to a thing or a relation, and how we gain new knowledge. Cassirer proposes to account for concept formation by developing a concept of relation that conceives of the process of abstraction in functional terms, albeit within a dynamized neo-Kantian framework.[304] Arbogast Schmitt has described the basic *functional mode of rationalistic concept formation*, which traces back as far as Plato, as follows:

"*This is the basic meaning of the distinction introduced by Plato and later taken over by Aristotle, namely, that one recognizes a thing not in terms of the sensory data we have of it, but in terms of its 'work' (ergon), its activity or function. The latter one does not see, hear or feel but understands.*"[305]

Similarly, in his second Meditation, Descartes writes about this kind of insight first proposed by Plato:

"*And so something which I thought I was seeing with my eyes is in fact grasped solely by the faculty of judgement which is in my mind.*" (loc. cit, p. 21)

It is this conception and its anticipation of the *concept of function* that constitutes a significant distinguishing mark between rationalism and EAN. In rationalism, the essential assumption is that concept formation is an active process, i.e. the systemic-dynamical grasping of the function of an object: relying on our dispositionally innate basic structures and in accordance with elementary patterns and gestalts, we actively organize and synthesize the chaotic impression of the *field of vision* so things and their internal and external relations can be thought and conceptually grasped in terms of their *function*. In certain simple domains, this is a visual process where the imagination has a central role; with domains becoming more complex, the process gradually changes into a conceptual one. The concept is the superior means of fixing, shaping, interrelating and enhancing thoughts. It has the double role of a dynamically structur-

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304 Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, pp. 12–24.

305 Arbogast Schmitt, Modernity and Plato: Two Paradigms of Rationality, Camden House 2012, p. 97.

ing function and a means of freezing the insight gained as a rule, it expands in the process of cognition and is not just a name for things. The concept "motor" is not derived from the black thing that sits under the hood and can be perceived by the senses but from the function which we understand and rationally appreciate to a certain extent. This extent will, of course, vary from layperson to car mechanic to automotive engineer: the engineer will associate the concept of function "motor" with thousands of material constants, physical laws, data and technical contexts. It is not just a name but a system of features and relations that are meaningfully and appropriately linked among themselves as well as to other concepts, all of which are guided by the rule of thought and depend on the relevant perspective. In empiricism, in contrast, the role of the concept is more or less that of an affixed name tag. For John Locke, this is supposed to happen as follows:

"*As simple ideas are observed to exist in several combinations united together; so the mind has a power to consider several of them united together, as one idea; and that not only as they are united in external objects, but as it self has joined them. Ideas thus made up of several simple ones put together, I call complex; such as beauty, gratitude, a man, an army, the universe; which though complicated of various simple ideas, or complex ideas made up of simple ones, yet are, when the mind pleases, considered each by it self, as one entire thing, and signified by one name.*"[306]

This is a fundamentally different figure of thought. Here, the particular "simple ideas" that we are supposed to receive like so many atom-like building blocks of objects present themselves to the passively receiving mind pre-portioned, "bite-sized," by these very objects. But the mind also possesses an – incidentally unobservable – metaphysical power to somehow assemble these particular building blocks and conglomerates of sense experiences. HOW this is done remains untold. According to Locke in the above example, the *simple ideas* that are received as sense experiences (and of which, by the way, one would need to know precisely where one simple idea begins and the one next to it ends, for instance in the case of color shades) are assembled into a complex idea, like "army" and designated, "when the mind pleases," by the name "army." But how is this formation of a general concept achieved and, what is more, how do we know the exact range of meanings covered by it? Thus, I may have sense experiences of many figures (soldiers), shades of green, a metallic sparkle, impressions of military equipment, I may hear the sound of marching, see headpieces (helmets). But this is not the concept army, for an army is an institution with hierarchies of command, units of troops, ranks, logistics, behavioral codes, constraints, laws, a multitude of weapon systems and

[306] John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II xii 1, p. 97.

functional components that even years of observation would not make me understand by sense experience alone. This is the point where we come up against a first central dilemma of EAN, namely, that *sense experience* is supposed to be the one and only, the ultimate basis of all knowledge while the understanding is endowed with a relatively unclear and, in most cases, rather sketchily described function that is dissociated from sense experience and, once again, *unobservable*. This function of the understanding is always referred to when empiricism is criticized ("Locke does know the operations of the mind…") but in the final analysis, when addressing the overall construction, EAN authors will stereotypically fall back on the criterion of sense experience – "experience" –, notwithstanding the fact that the correct term, according to empiricism's own premises, should be sensation and nothing else! On the other hand, they cannot allow for too much spotlight on the "operations of the mind" for, then, the danger of rationalism would become imminent (as is already alarmingly the case in Locke's Book IV). As a consequence, the problem of how complex abstract concepts such as "army" are formed remains unsolved. A more in-depth analysis of these problems will be proposed in a later part of this book.

John W. Yolton has succinctly pinned down the problem of what might be the origin of the "non-sensory ideas" that the understanding is supposed to assemble by means of mental operations, frequently referred to by Locke under vague terms such as "considers," "reflects upon," "concludes," etc.:

"*The central ambiguity in his (Locke's) program is the nature of reflection and its role… In strictness, then, no idea comes from experience on Locke's program since it is ideas of all sorts which make up or constitute experience… If Locke restricts experience to sensation and introspection, then he has not shown how all ideas are derived from experience. But if we allow the extension of his concept of experience to cover any act of the mind, then clearly any mental content will be experiential. Such a position may have been sufficient for Locke, with innatism as the enemy, but it would hardly seem satisfactory for empiricism.*"[307]

A striking feature besides this dilemma, put in a nutshell by Yolton and appropriately dubbed "Yolton's dilemma" by Lorenz Krüger,[308] is the leniency shown, in EAN discourse, towards Locke's hundreds of inconsistencies. For apart from the above dilemma, there is a host of other serious problems that become manifest in this context: how are the boundaries between *simple ideas* defined since – to stay with Locke's example – there are so many exterior aspects of this army, so many colors and shades

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307 John W. Yolton, The Concept of Experience in Locke and Hume, in: Journal of the History of Philosophy, Vol. 1, No. 1, October 1963, pp. 53–71.

308 Lorenz Krüger, War John Locke ein Empirist? In: Udo Thiel (ed.), Klassiker Auslegen, Essay über den menschlichen Verstand, Berlin 2008, p. 80.

and an infinite variety of forms that I might perceive? When do I know that this patch is the right red rather than the one next to it, that this is an elliptic form of helmet rather than a round one? How are the particular observations, invariably different, reworked into general concepts? How is my perception of the army's abstract functions, which I can never see, supposed to happen? How can mere observation let me know the inner workings of an army? Locke speaks of the "perception of the operations of our own minds within us, as it is employed about the ideas it has got" (loc. cit. II i 4). But who is able to *perceive* the operations of his or her own mind? Nobody to my knowledge has ever possessed such powers of observation. Who furnishes the mind with the particular ideas, assumed to be both raw and, at the same time, fixed entities? If these sense experiences were raw, they should be myriads of rhapsodic particular impressions rather than ideas. Even "red" is already a general concept for a totality of perceptions of red rather than one particular sense experience. What are the patterns, rules or structures that enable the as yet empty mind (the blank slate) to connect these perceptions in a meaningful rather than haphazard and random way, given that it has as yet no "blueprints" to rely on for assembling the allegedly simple ideas? So there is a whole host of questions, which we propose to address in more detail in the context of our discussion of Locke later in this book. These brief remarks, however, already show that actually, empiricism's basic idea of the process of perception and, arising from it, the sensualistic form of concept attribution does not in any way allow for the forming of *general* and *abstract concepts*.

This central and fundamental deficiency is highlighted by, for example, A.H. Basson in his presentation of David Hume and the latter's systematical radicalization of John Locke's project that, for all its inconsistencies, was after all still provided with certain lifelines. Basson argues that regarding the way concepts are described, one should distinguish between the terms "ostensible" – which could be construed as immediately visible or perceivable – and "functional" – which to some extent might be seen as foreshadowing the concept of function. Basson's example here is a boot (yet another case of empiricists' unchecked predilection for things, the "tenderness for things," as Hegel once described it, or "reification," as Ernst Bloch would say):

"*What is a boot? We may say it is a leather object of certain shape and construction, or we may say it is an object whose function is to protect the foot. …Some feel that they gain real understanding of a thing, only if they can recognize it at sight, or visualize it clearly. Others feel that real understanding lies in an insight into the function of a thing. Hume and other empiricists are examples of the former tendency; perhaps the ancient Greek philosophers were examples of the latter. The former demand ostensible definitions, the latter functional definitions.*"[309]

[309] A.H. Basson, David Hume, A Pelican Book, Penguin Books 1958, p. 134f.

So, while Hume and the empiricists (and, subliminally inferred, every normal person today) rely for their definition of things on descriptions of what is already known and easy to visualize, there may have been, once upon a time in ancient Greece, some – according to Basson – outmoded philosophers who called for a concept of function. That this is the much more intelligent rationalistic strategy of understanding a thing remains undiscussed. But then, Basson presents another example, namely the concept "food," which is defined by its being nourishing. With this example Basson realizes that it is obviously impossible to accompany every single item of food with an adequate description, for this would lead to a virtually endless enumeration of sensory qualities:

"*Thus, an ostensible definition or even ostensible characterization of food is out of the question. The situation is aggravated when a philosopher maintains, as Hume does, that a word has meaning only if its meaning can be explained in terms of apparent qualities, that is, only if an ostensible definition can be given. It would seem that Hume should say that the word 'food' is meaningless.*"[310]

This simple example already shows that even on the level of things, the dogmatic insistence on the *ostensible* definition, that is, the sole reliance on what is perceptible through the senses and the failure to take into account the concept of function cannot but lead to a dead end. Remarkably, even in this context Basson uses only things *we already know* as examples, i.e. boot and food. From an empiricist point of view, this is of course a wise move. What, indeed, would come of his example if his starting point for sensory perception was a more complex thing (e.g. an iPhone or an App)? Would anybody understand these devices by sensory perception rather than by grasping their (non-perceptible) functions and applications by way of thinking? Thus, the concept of function would seem to be the more efficient and more adequate approach. And in all this, we have not even touched upon the level of *abstract concepts*. With respect to Hume's rejection of the mind (the "ghost in the machine" according to G. Ryle) even Basson, acknowledging the precarious situation, cannot help noting:

"*The doctrine of the impossibility of unperceivable entities thus leads to the rejection of mind, or mental substance, just as it led to the rejection of the material substance. …It is the doctrine that what is not self-contradictory is conceivable, and what is conceivable is perceivable. That is the basic postulate of empiricism. It thus appears that Hume must either reject empiricism or accept solipsism.*"[311]

As a humorous aside, let me quote one of Hume's many apodictic statements, in this case in the context of his discussion of food, which, like most of the claims he makes so presumptuously and with utter convic-

310 A.H. Basson, David Hume, Penguin books 1958, p. 135f.
311 A.H. Basson, David Hume, Penguin books 1958, p. 137ff.

tion, is simply wrong. In his "Enquiry Concerning Human Understanding," invariably following his sensualistic belief, he writes:

"*Our senses inform us of the colour, weight, and consistence of bread; but neither sense nor reason can ever inform us of those qualities which fit it for the nourishment and support of the human body.*"[312]

Due to the consistent application of mathematics, physics, chemistry, medicine, experiment – that is, the methods relied on by Descartes – we are today lucky enough to know everything, and I mean really everything, about cereals, bread, starch, the breaking-down of starch in the body into glycogen and glucose, the function of amylase, the "burning" of carbohydrates, etc., and to be able to exactly explain *why* bread is nourishing. As a result, we can state that Hume's claim is simply wrong.

Locke and Hume will later be discussed in more detail, but in order to understand the essential differences between rationalism and empiricism dealt with in this chapter, it was important to already highlight the fundamental difference in the theory of concept formation and demonstrate the aporia of the empiricist procedure of seeking to come to a definition of general and abstract concepts on the basis of sense experience alone.

But let's get back to Cottingham's brief summary of *rationalism*. For Cottingham, a priori knowledge is another essential element of rationalism: the fact that we invariably engage in the act of cognition with a pre-structured "thought program," a fixed "set" of thought functions, failing which the experiences we receive from our senses could never be filtered, selected, organized, linked in a pattern-based way, and identified in terms of concepts. The *a priori* as positioned by Kant steers clear of the mode of "innate" but retains the rationalistic core at the functional level. Laurence Bonjour comments on this as follows:

"*Synthetic a priori knowledge would not be possible, Kant argues, if the objects that such knowledge purports to describe were independent objects external to the knower, things-in-themselves that are part of independent an sich reality. It is only if the objects of knowledge and the experience that presents them must somehow conform to the faculties of knowledge, rather than the other way around, that synthetic a priori knowledge becomes possible, a suggestion that constitutes Kant's famous "Copernican Revolution" in philosophy (Bxvii-xviii). The rough idea, of course, is that the mind so shapes or structures experience as to make the synthetic a priori propositions in question invariably come out true within the experiential realm. Thus, synthetic a priori knowledge, according to Kant, pertains only to the realm of appearances or phenomena, not to an sich reality.*"[313]

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312 David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, IV ii, p. 33.

313 Laurence Bonjour, In Defense of Pure Reason, Cambridge University Press, Cambridge 1998, p. 23.

Since in the *Critique of Pure Reason*, Kant starts out from the question of *how* synthetic a priori judgments are at all possible but keeps a low profile when it comes to asking *"why we have precisely these and no other functions for judgment or … why space and time are the sole forms of our possible intuition"* (B 145/146), the question remains, of course, unanswered. We will below devote a separate chapter to a discussion of this problem in Kant. Rationalism today, insisting on a more specific answer, finds it – in conjunction with the sciences – in Plato, Descartes and in Leibniz, namely in terms of the declared belief in and defense of *innate knowledge*, or *innate faculties*. Descartes time and again emphasizes the fundamental importance of innate faculties and the *natural light*, and Leibniz, too, conceives of it as a disposition of the understanding and recognizes it as an active principle. Here Leibniz refers to Locke's metaphors of the mind as a blank slate and an empty page on which the letters of the sense experiences imprint themselves:

"*The mind is capable not merely of knowing them but of finding them within itself. If all it had was the mere capacity to receive those items of knowledge – a passive power to do so, as indeterminate as the power of way to receive shapes or of an empty page to receive words – it wouldn't be the source of necessary truths, as I have just shown that it is. For it can't be denied that the senses are inadequate to show the necessity of those truths, and that therefore the mind has an active disposition to draw them from its own depths; though the senses are needed to prompt the mind to do this.*"[314]

He conceives of the innate mind as the source of necessary truths and attributes both passive and active faculties to it. The senses are not ignored – a charge often leveled at rationalism – but posited as a necessary condition for the mind to become active. Leibniz goes on to say:

"*But the proposition a square is not a circle might be called innate, because the ideas of square and circle are innate, so in having the thought that a square is not a circle one is applying the principle of contradiction to materials that the understanding itself provides, as soon as one becomes aware that these innate ideas contain incompatible notions.*"[315]

In the context of the present discussion, this is a highly significant remark: for Leibniz presents an intuitive, spontaneous, *visual* application of the principle of contradiction and describes this process as becoming "aware" i.e. seeing "that these innate ideas contain incompatible notions." He interprets both of these simple, intuitive truths (the square and the

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[314] Gottfried W. Leibniz, New Essays on Human Understanding. Preface and Book I: Innate Notions, 2010–2015, http://www.earlymoderntexts.com/assets/pdfs/leibniz1705book1.pdf, p. 21–22.

[315] Gottfried W. Leibniz, New Essays on Human Understanding. Preface and Book I: Innate Notions, 2010–2015, http://www.earlymoderntexts.com/assets/pdfs/leibniz1705book1.pdf, p. 23.

circle) as "innate," just as in the above discussed example presented by Plato in the Seventh Letter, and at the same time as an application of the principle of contradiction (even though the person applying this principle may not be aware of it). Moreover, it is a geometric problem, and we will later deal with visual thinking in geometry in order to show how intricately visual thinking is linked to the nature of geometric science. Leibniz is also the source of the metaphor that likens innate dispositions, or preformations of reason, to a statue being carved from a block of marble, the "Hercules … in an uncarved piece of marble": the sculptor lets himself be guided by the veins that preexist in the piece of marble, for while there are many ways for the artist to accomplish his work there are also some that are essentially pre-formed by these preexisting structures.[316] The Stanford Encyclopedia comments:

"*Leibniz' metaphor contains an insight that Locke misses. The mind plays a role in determining the nature of its contents. This point does not, however, require the adoption of the Innate Concept thesis.*" (loc. cit.)

I quote this comment here because it very clearly describes the modern EAN attitude. It acknowledges that something is wrong with Locke's account of the process of cognition, which is only fair, but then half-heartedly states that the mind "plays a role in determining the nature of its contents". Only a role? If in the initial act of perception, all the content perceived is already being formed, imagined, structured, transformed into ideas and, eventually, concepts by the mind, if the mind in the very same act applies these concepts in judgments, draws conclusions from them and even calls all of this into question and reflects on it, then this is certainly more than just "playing a role"! But the very next sentence tells us to rest assured: no need, for all that, to change sides and opt for the concept of innate ideas,

At this point, I suggest we go back a step and reconsider the doctrine of innate principles and ideas, innate knowledge. In a later chapter, this issue will be more specifically dealt with, so I will now confine myself to a brief discussion from a very simple, common sense perspective. What is it that is so incomprehensible, so objectionable about this doctrine? Let's simulate an analogical situation and, for a moment, slip into the world of desktop computers. Serial models typically come with a preinstalled operating system and preinstalled programs as listed in the catalogue from

316 Gottfried W. Leibniz, New Essays on Human Understanding. Preface and Book I: Innate Notions, 2010–2015, http://www.earlymoderntexts.com/assets/pdfs/leibniz1705book1.pdf, p. 4. Also in: Gottfried Wilhelm Leibniz, Betrachtungen über die Erkenntnis, die Wahrheit und die Ideen, Fünf Schriften zur Logik und Metaphysik, Stuttgart 1982, p. 16 (engl.: *General Inquiries About the Analysis of Concepts and of Truths*).

which you order, and their performance depends on the power of this preinstalled operating system. (Of course, this example should not mislead us into losing sight of the difference between our reflective, self-conscious mind and the functionality of computers, for we already select and structure the incoming sense data, are conscious of self, etc. while the data fed to a computer must always be identically formatted; but this is only meant as an example, after all.) In principle, the external data stored on the brand-new computer is no different from the data stored on a predecessor model, but one would of course prefer to have the latest model since its preinstalled operating system offers more functions and, in most cases, is more powerful. Now, different computer models and generations are not distinguished by the data that were fed into them ('… that's the computer where our neighbor stored his vacation snaps'), nor is the computer's system program established step-by-step from the incoming data that accumulates over time and will inevitably differ with each user's habits. It's unthinkable to install a computer with only an empty hard disk (a tabula rasa) and no operating system at some place or other, wait for a rhapsody of data from some source that happens to be nearby to come streaming into it, and expect it to concoct its own logical language and operating system from copies of these data. This would be absurd.

So, in order to enable meaningful operations with data from outside, there must be an *operating system* that is *preinstalled*, that is, exists *a priori*, or else we would only have a storage device or a hard disk that is unable to organize, separate and link the data, file them in a hierarchically structured way and execute the operative commands. Moreover, operating systems must have the same structure and communicate in the same language, or else the data of one computer could not be processed on another one. How to get out of this dead-end situation of being stuck with nothing but a hard disk (tabula rasa)? Let's do a short thought experiment and try to work out a rescue operation. One might hit on the idea of a computer language that is being created when the hard disk is already operating. But how is a computer language supposed to be generated when there is no structure? Or one might acknowledge being stuck with a hard disk without a preinstalled operating system but assert that a language is being created through acquaintance (Russell), drill ("Abrichtung," Wittgenstein) or inculcation (Quine) from billions of external, fragmentary data. But how is this "computer language" supposed to create itself from the disparate shreds of data, and where is it supposed to get its syntactic structure? A miracle! So, shouldn't at least parts of this language be preinstalled, a rudimentary grammar program, as it were? And how can we ensure that the grammar program created from fragmentary external data will be applicable to further and, eventually, all chunks of data that

happen to emerge from the chaos? Even a preliminary unbiased consideration will make one realize that the mode proposed by the empiricists, i.e. the creation of a logically operating structure from external data alone and without a preinstalled system program, is simply impracticable. Obviously, a preinstalled program, which in humans means a *dispositionally innate*, functional *mental* structure, is needed to solve the problem which, when faced in a computer, is not felt as such. As Steven Pinker has succinctly put it:

"*Simple logic says there can be no learning without innate mechanisms to do the learning. Those mechanisms must be powerful enough to account for all the kinds of learning that humans accomplish.*"[317]

What exactly this innate knowledge is about is still vague at this point, but we will later go into this in detail.

Let's now apply the insight thus gained to the debate of rationalism vs. empiricism. The higher the level of development reached, in the course of evolution, by the preinstalled operating system (the natural light), the understanding, the greater the ability of a living being to organize, structure and operate with sense experiences. Take, for example, the fly. It should really be proclaimed the heraldic animal of empiricism, for it is endowed with sense organs that are huge for its size and enable it to capture a host of *sense experiences – sensations* in Locke, *impressions* in Hume. Unfortunately, however, it has only a very small brain of about one cubic millimeter. It is able to copy external sense experiences without thinking, it is endowed, as propagated by Hume, with a natural instinct, and it is guided by custom and response.[318] Of course, we can't imagine what it is like to be a fly capturing this multitude of sense experiences, but measured against the size and complexity of its sense organs, the inflow of sense experiences should be all but negligible![319] Now, when the fly hits a glass pane, chances are that it will make the same experience over and over again (that is, gain the impressions and sense experiences associated with

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317 Steven Pinker, The Blank Slate, Penguin Books, New York 2003, p. 101.

318 David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, Section 9, On the Reason of Animals, p. 79–82. Hume states that animals are of "imperfect understandings" and that their behavior can, therefore, not be "guided by reason." Rather, they are guided by *instinct*, but then, Hume argues, man's reason, too, "is nothing but a species of instinct or mechanical power." Hume puts the thinking of men and animals at the same level but unlike what some authors suggest, he does so not because animals have reason but because he reduces the reason of man to an instinct, thus leveling down the difference – "zur allgemeinen Volksfreude" ("much to the joy of the populace," Hegel).

319 The classic: Thomas Nagel, What Is it Like to Be a Bat? The Philosophical Review, 1974.

hitting the glass pane) and then, guided by custom and instinct, go on to re-hit the pane. Its problem is that behind its sense organs, there is only a very limited "operating system" that is unable to adequately assess and analyze the sense experiences it empirically receives. From "experience" the fly obviously learns – nothing! Gaining *sensations/impressions/sense experiences* is obviously of little use unless there is logical thought that allows for them to be structured, identified and assessed. Gaining experience thus does not mean receiving sense experiences, it actually means applied thought. Deeper insight, therefore, would seem to result not from the larger number of sense experiences received but from the more intelligent and more highly developed "preinstalled operation system." Behind the seeing eyes, the brain has evolved in the course of evolution, thus allowing for a more efficient processing and structuring of incoming sense data. As the poor "fly in the fly bottle" shows, sense data alone are insufficient to solve the problem and escape. From this we conclude that cognition is enabled neither by the mass of originary *sensations*, *impressions*, *sense experiences* nor by custom, acquaintance and belief but by understanding and reason alone, by the "natural light."

Diametrically opposed to the doctrine of empiricism, rationalism as outlined by Cottingham adheres to the basic idea that certain capacities of the understanding must be *dispositionally innate* to enable cognition and knowledge. A more recent concrete example is the structure of the *universal grammar* of language, as Noam Chomsky has shown.[320] Each of the Earth's many languages has different words and peculiarities, and each human being has a different way of speaking. The underlying *deep structure* in grammar, however, is the same in all languages, or can at least be reduced to the same structural elements, and all children, given normal exposure, learn to speak in more or less the same way, just as all children learn to stand and walk at about the same age. The dispositionally innate faculty awakens at about the *same age* and in about the *same way*, structurally speaking, and what develops is the ability to walk, not to fly. If the genetic disposition is not awakened by adequate stimuli within the time frame allowed for it, for example in the case of vision, the dispositionally innate faculty atrophies. If it can unfold normally, it accomplishes the same, again structurally speaking, for all humans, and one is able to walk or see. Pointing out that there also are humans who have poor eyesight or difficulties in walking only strengthens the rational-biological core of the argument but does not invalidate the underlying principle.

Reflecting about logical reasoning and geometrical problem solving, Plato was the first to realize, and very early so, that there must be some-

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[320] Chomsky, Cartesian Linguistics, Cambridge University Press, Cambridge/New York (1963) 2009; Rules and Representations, Columbia University Press 1980; Language and Mind. Enlarged Edition, Harcourt Brace Jovanovich 1972.

thing like innate, a priori knowledge. In his "Meno" dialogue – which will be discussed in detail in Book II – Plato shows that one of Meno's slave boys who does speak Greek but is otherwise uneducated and illiterate is able to solve a non-trivial geometrical problem when appropriate questions are used to let him find his own solution. Innate intuitive visual thinking allows him to suddenly, in the blink of an eye, "see" the correct solution, and Plato concludes from this that he must always already have had this knowledge in his soul, or else he would not have been able to "retrieve it from within himself." In his Meno and Phaedo dialogues, Plato discusses the paradoxical fact that, necessarily, a man either has always already known something but, then, would not search for it, or, inversely, does not know it but, then, cannot find it because there is no way for him to know he has found it when he finds it (Chomsky called this "Plato's problem"). So, Plato needs to explain why the slave boy was able to solve the problem without previous education or experience. Due to his Pythagorean interests, or perhaps also his Egyptian journeys, he suggests that the slave boy's soul must have seen the solution in the course of metempsychosis and that he therefore more or less "recollects" the solution thus once seen. This, of course, is the very point for empiricist commentators to hook in and charge him with mysticism (in which they are right) and, with regard to the mythical explanation by metempsychosis, dismiss the whole line of thought as idealistic humbug. However, one should keep in mind that Plato conceived this dialogue at about 350 BCE and that at the time one could not really know the theory and the biological mechanisms of evolution (a knowledge some refuse to accept even today). For all his ingenious reasoning, Plato could therefore hardly reach the conclusion that the slave's surprising capability might be genetically innate. So, Plato is actually treated somewhat unfair in this context, for he sought to give the best possible answer, according to the standards of his time, to a logical question that had arisen while the real answer clearly lay beyond the horizon of what could possibly be known at the time. At any rate, Plato's approach to the solution, i.e. assuming that a structured previous knowledge, a "natural light," must in some way preexist, remains a keystone of rationalistic philosophy, its most prominent proponents being Herbert von Cherbury,[321] René Descartes, the Cambridge Platonists (among them Henry More and Ralph Cudworth)[322] and, later, Gottfried Wilhelm Leibniz, among others.

So, in order to better understand the doctrine of rationalism let us go on to retrace the further development of this fundamental idea. After a

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321 Cf. for instance: R.G. Kottich, Die Lehre von den angeborenen Ideen seit Herbert von Cherbury, Berlin 1917.

322 Ralph Cudworth, A Treatise Concerning Eternal and Immutable Morality, Cambridge University Press, Cambridge 1996.

latency of more than thousand years, it was revived by Descartes in – as Dominik Perler puts it – *"a Plato-inspired theory of potential knowledge,"*[323] where Plato's approach is reworked into a groundbreaking comprehensive system centered on the self-conscious, creative, modern subject. In this, Descartes' understanding of "natural light," "simple natures," "good sense"[324] is fundamentally committed to Plato's doctrine. I'd further argue that it is quite justified to attribute a biologistic view to him – to a certain extent and within what was thinkable in the 17th century, and notwithstanding his declared belief in God. A letter he wrote to his friend Mersenne in 1639 supports this view:

"*I distinguish between two kinds of instinct; one belongs to us in so far as we are men and is of a purely intellectual nature: this is the natural light or intuitus mentis on which I hold that we should alone rely; the other instinct is in us in so far as we are animals and consists of a certain natural impulsion for the conservation of our bodies…*"[325]

Descartes refers to an instinct of a "purely intellectual nature," the "natural light," on which man "should alone rely" (and which, like any instinct, is of course innate) and argues that insofar as we are also animals, we are guided by the instinct of self-preservation. (It should be noted in passing that this passage also runs counter to all insinuations that by his dualism, Descartes subverted the overall integrity of the person, as well as the whole of anthropology, and diminished the value of animals. The opposite is obviously true.) We should be guided, he says, by this instinct of a purely intellectual nature, this natural light, alone. This strongly suggests a biology-oriented rationalism, God not being referred to in this context. Based on this line of thought, and as already discussed with respect to his "Rules for the Direction of the Mind" (Regulae ad directionem ingenii), Descartes explains that we are able to intuitively and "all at once" recognize simple natures, that is, elementary, fundamental logical relations, which for him means facts that are so simple that they can be naturally penetrated and understood by anybody, not unlike Meno's slave boy. It would seem obvious that within this basal capacity of thought, acquired in the course of biological and cultural evolution, visual thinking, too, must have developed. Descartes goes on to say:

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323 Dominik Perler, René Descartes, München 2006, p. 1.

324 René Descartes, Discourse on the Method, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 111.

325 As quoted in: L.J. Beck, The Method of Descartes, The Clarendon Press, Oxford 1952, p. 63.

"*Secondly, we should note that there are very few pure and simple natures which we can intuit straight off and per se (independently of any others) either in our sensory experience or by means of a light innate within us.*"[326]

What we can infer from this passage, as well as for the purpose of the present discussion, is that all human beings have the innate light, that is, the innate faculty to uniformly grasp simple structured relations with necessity and universality. Relations can thus be grasped "in our sensory experience" and lead to an insight that cannot be gained by sense experience alone. In this passage, Descartes clearly refers to a "sensory experience" onto which we "project" these simple relations by thinking; he obviously does not deny their role in the process of cognition! He also says that there is only a limited number of simple natures, i.e. elementary facts, from which, guided by the natural light, we can build our knowledge. Interestingly, given the key importance the simple natures have in his system, Descartes does not offer a precise definition of how to conceive of or delimit them. The most helpful clue in this regard would seem to be a passage from Rule Twelve where Descartes refers to a body that is composed of simple natures:

"*…, it is not possible for us ever to understand anything beyond those simple natures and a certain mixture or compounding of one with another. … For example, I can have knowledge of a triangle, even though it has never occurred to me that this knowledge involves knowledge also of the angle, the line, the number three, shape, extension, etc. But that does not preclude our saying that the nature of a triangle is composed of these other natures…*"[327]

This passage now helps us to come to a better understanding of what a simple nature might be. Firstly, and interestingly, relations that are recognized by the innate human understanding by means of intuitive insight are described as natures. This not only makes sense but is seminal for rationalistic Neo-Kantianism. We must further keep in mind that simple natures are by definition grasped all at once by means of intuitive insight, intuition, that is, by knowledge that is gained "straight off" in the very act of seeing. In Rule Eleven, Descartes defines the conditions for this act of rational insight as follows:

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326 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 22.

327 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 46.

"*…, because two things are required for mental intuition: first, the proposition intuited must be clear and distinct; second, the whole proposition must be understood all at once, and not bit by bit.*"[328]

We thus have a precise definition of the *act of intuitive insight*: the knowledge gained must be clear and distinct, that is, leave no room for doubt, and it must come all *at once* and not bit by bit.

This is of crucial importance for the present discussion because, firstly, this act is described as a sudden, "click-like" movement of thought that has little or nothing to do with the requirements of language-based thought. But what we look at when we see the simple natures that Descartes refers to in the above passage: the angle, the number three, the shape, are objects or relations – a line or a right angle, for example – that are grasped clearly and distinctly and all at once, at a glance, rather than bit by bit. The proposition would therefore be too slow – not "all at once" – in the build-up because it would be a sequence of words with meanings of their own: "this is a right angle and it resembles the other one in a symmetrical manner." It would indeed be the proposition that describes the grasping of this simple nature by linguistic means, but it would depend on the bit-by-bit process of syntactic build-up. However, in the definition given in Rule Eleven Descartes not only uses visual examples but clearly and distinctly refers to a sudden act, something that happens "at once." Any language-based propositional version would just lag behind, even though it of course remains the most adequate means of subsequently couching in language what was a sudden visual insight. Since the example of the triangle might be misleading insofar as it tends to divert from the insight into abstract relations, it should be noted that while a sudden insight such as: "hey, he's trying to con me!" can, of course not be visual in nature, it will flash up just as suddenly, in the manner of an Aha!-experience, while the sentence expressing it will come after the insight. In any case, at least in the Regulae, the visual mode remains fundamental and determining for Descartes.

Two essential questions still remain: firstly, whether the insight that is gained in the intuitive act of cognition and is supposed to be so certain really leads to a correct result; that is, whether the internal power of the "cognitive click," or intuitus, is really "right" when compared to explanatory patterns that present themselves later as a result of prolonged and, perhaps, more adequate reflections; and, secondly, whether this insight objectively corresponds to the external world of real things. In another well-known passage, Descartes says:

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[328] René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 37.

"*It follows from this that the light of nature or faculty of knowledge which God gave us can never encompass any object which is not true in so far as it is indeed encompassed by this faculty, that is, in so far as it is clearly and distinctly perceived.*"[329]

This often-quoted passage is important for a number of reasons. Firstly, it requires some careful reading. For at the beginning of the sentence, Descartes once more refers to the natural light as a faculty that is grounded in our *nature*, and in doing so uses the visual metaphor of the light. Now, what does this mean? As I see it, Descartes conceives of this light of nature as the totality of our natural, innate, rational endowment. In terms of current scientific knowledge, this would be the innate, natural capabilities that have emerged in the course of evolution and are genetically fixed in our DNA. Descartes also refers to it as "a sort of innate light"[330] and, in yet another passage, says he is convinced that we possess

"*… certain seeds of truth which are naturally in our souls.*"[331]

Thus, Descartes clearly states that, firstly, we possess certain innate faculties; that, secondly, these faculties are "*seeds of truth which are naturally in our souls*"; which, thirdly, means that they must be dispositional capabilities that are potentially present at birth and can be situationally activated, as suggested by the biologistic metaphor of the seed. The seed is in the soil and, in the absence of certain environmental conditions, may remain there forever, but it may also be activated by humidity and go on to develop into precisely the plant of which it is the seed. It does not deviate from its biologically defined nature, i.e. the specific plant, just as our mind does not deviate in its faculty of grasping simple natures. Fourthly, the passage suggests that these seeds make us "truth-apt," that is, ensure by their very nature the aptitude for truth of man who, at least in certain elementary respects, is himself a product of nature. In other words, we have innate, preinstalled, natural faculties that provide us with a human "basic program" of cognition and enable us to be enlightened on simple natures, or elementary relations, by means of our natural light (that is, visually developed thinking). If we see the relations clearly and distinctly – or, perhaps more to the point as a translation: adequately differentiated – we have understood the relations (natures) intuitively and evidently, that

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329 René Descartes, The Principles of Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 203.

330 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 44.

331 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 144.

is, unequivocally and at the same time adequately differentiated, or differentiated in keeping with their nature – in accord with the seeds of reason that are naturally in us! This is why Descartes, as discussed above, refused to develop an explicit concept of truth in the context of these reflections, for the truth has always already been implicitly grasped. No insight can become "clearer than clear"! Detlef Mahnke comments on Descartes' view as follows:

"*Truth cannot be 'made' for it is present already before any undertaking of this kind. It shines as the 'lumière naturelle' that enables us to see, in the first place, and is the same in all humans. Error can only be in the knowledge that the initial knowledge seeks in a secondary move, and will occur whenever wrong views overlie the truth and, thus, cloud or bar the insight into it.*"[332]

Although Descartes, in the sentence previously quoted, puts "natural light" and the "faculty of knowledge which God gave us" on one and the same level (the linking word being "or"), this line of thought can very well be taken further even by an agnostic, for example, or someone who finds himself unable to believe in any God. There is no doubt that Descartes was educated by Jesuits, that he remained a lifelong Catholic and that as such he was resented as a counselor and tutor of Queen Christina in Protestant Sweden.[333] There has been much debate about whether Descartes went to the Netherlands for fear of the Inquisition or simply because he wanted to work undisturbed. What is certain is that he was deeply upset by the 1633 prosecution and conviction of Galilei by the Vatican and, as a matter of prudence, abstained from publishing his writing "Le Monde" ("The World") that was based on a heliocentric worldview.[334] I will, however, not go into any of these debates but rather read Descartes' doctrine as a *humanistic, reason-based, science-affine rationalism* whose internal structures and basic ideas remains fully effective and sound even without a concept of God or any other non-rationalistic entity and have, after all, been deemed "rationalistic" enough to be placed on the Index of Prohibited Books by the Church in 1663. And even Andrew Gluck, whose study "Damasio's Error and Descartes' Truth" is clearly committed to a religious intention, offers some cautious criticism in this respect:

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332 Detlef Mahnke, Der Aufbau des philosophischen Wissens nach Descartes, München/Salzburg 1967, p. 76.

333 Ernst Cassirer, Descartes, Lehre – Persönlichkeit – Wirkung, Hamburg (Meiner) 1995, p. 177ff.

334 Cf. Stephen Gaukroger, Descartes: An Intellectual Biography, Clarendon Press, Oxford 1995, p. 38f, p. 187f., p. 190, p. 226.

"*Descartes allowed himself to look at the world at times as if God did not exist even though he sincerely believed that He did exist.*"[335]

On the part of EAN, on the other hand, Descartes is rejected as unscientific because in their view he too strongly relies on justifications by God and because of an (not entirely unfounded) hunch that underlying his dualist conception, there is a tacit attempt to construct an isolated, immaterial soul for the purposes of faith that would be equally compatible with both the religious doctrine and his philosophy. But as things stand, John Locke, the founding father of modern empiricism, was himself grappling with the problem of how to explain simple ideas as originating from "external" things and, most of all, how to ascertain that these building-block-like *simple ideas* correspond precisely to the things in question since we can, after all, represent the latter only qua idea! Which is a well-known problem among experts in Locke's philosophy.[336] For the rationalist, however, it is highly gratifying to read how Locke seeks to wriggle out of this dilemma. This is what he writes about the origin of simple ideas in Book IV of his Essay:

"*… simple ideas, which … must necessarily be the product of Things operating on the Mind in a natural way, and producing therein those Perceptions which by the Wisdom and Will of our Maker they are ordained and adapted to. From whence it follows, the simple ideas are not dictions of our Fancies, but the natural and regular productions of Things without us, really operating upon us;…*"[337]

This passage is remarkable in more than one way. Firstly, we are once more confronted with the idea of a *passive* process where the things are "operating upon" the mind and produce the simple ideas, not unlike the "eidola" which the things, according to the Greek materialists, are sending to the receiving soul. For Locke explains that the simple ideas are "productions" of the things and are triggered in us by the latter by means of the perceptions. But the really important point here is that it is "*our Maker,*" i.e. God, who "*ordained and adapted*" all this in such a way that we can be sure that the simple ideas thus obtained are not mere fictions, that the perceptions provide adequate representations, that the things really are what they appear to be in the simple ideas. In this important passage, *God* is the guarantor for the congruence of insight and world, just as he is in Descartes, Spinoza, Leibniz and, in part, also Kant. John Locke is no exception in this respect, but in EAN the blackjack "God" is only ever used against Descartes and virtually never against Locke who, in keeping with

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335 Andrew Gluck, Damasio's Error and Descartes' Truth, Scranton and London, University of Scranton Press 2007, p. 73.

336 Cf., e.g., John L. Mackie, Problems from Locke, Clarendon Press Oxford 1976.

337 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, IV iv 4, p. 361–362.

the historical epoch, relies on the very same conception! For him just as for the rationalists of the time, God is what guarantees the congruence between the mind and the external world. The founding father of empiricism, Locke, is by no means an exception.

From a latter-day perspective I feel justified in assuming, as already argued above, that whenever Descartes refers to God in an epistemological context, God is synonymous with nature ("*light of nature or faculty of knowledge which God gave us*"), not unlike Spinoza in later times ("Deus sive Natura"). As I see it, the logical structure and argumentative power of Descartes' rationalism is still fully effective, and a solid scientific foundation, with this approach. As a test, let's simply do a creative *thought experiment* and replace the reference to God in the previous passage from Descartes by the term "evolution." The result would be:

"*It follows from this that the light of nature or faculty of knowledge which* evolution *gave us can never encompass any object which is not true in so far as it is indeed encompassed by this faculty, that is, in so far as it is clearly and distinctly perceived.*"

It's perfect! The proposition is no less concise, it is fully comprehensible from a modern, state-of-the-art perspective, and nothing is lost of the power of its message. To be sure, Descartes' ingenious rationalism is thus taken out of its 17th-century context (where some would like to see it buried for good), but on the other hand, and in conjunction with state-of-the-art scientific knowledge, it is suddenly revealed as a powerful modern doctrine that will stand its ground. Noam Chomsky has seen this early on and, what is more, at a time when thinking was still largely in the paralyzing grip of behaviorism and positivism. However, for the purpose of the present argument it is fortunate that Descartes actually added the following specification to the title of his later dialogue, "*The Search for Truth by means of the Natural Light*" (which was written at about 1644-47,[338] after the Principles of Philosophy):

"*– This light alone, without any help from religion or philosophy, determines what opinions a good man should hold on any matter that may occupy his thoughts, and penetrates into the secrets of the most recondite sciences.*"[339]

Whoever is so inclined will recognize all of Descartes' seminal thoughts in this late work: the "natural light" (our innate reason) is able to clarify "without any help from (dogmatic) religion or (traditional Aristotelian;

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338 Artur Buchenau, Vorrede zu Descartes Erforschung der Wahrheit durch das natürliche Licht, 1906 in: René Descartes, Regeln zur Leitung des Geistes, Hamburg 1962, p. XVI.

339 René Descartes, The Search for Truth by means of the Natural Light, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 400.

WW) philosophy … what opinions a good man should hold" and "penetrate into the secrets of the most recondite sciences." This cognitive optimism spontaneously brings to mind Hegel's 1818 Inaugural Address and his statement that "*the closed essence of the universe contains no force which could withstand the courage of cognition.*"[340]

What results from this chapter is that rationalism was elaborated in its purest and clearest form in the philosophy of René Descartes and indeed provides an appropriate platform for a modern, scientifically informed rationalistic Neo-Kantianism, even though individual elements of Descartes' epistemology need to be modernized and transformed. Thus God, as shown above, can be replaced by nature, or evolution, while intuitive evidence, or visual thinking, the innateness of the understanding, and the leading role of reason remains valid.

## Descartes' method

A key concern of rationalism is to gain certain knowledge about the world – knowledge based on understanding and reason as opposed to opinion, belief, emotions, deconstruction, "anything goes," subjective sensitivities, or pure irrationalism – and, thus, to ensure solid and steady progress in the sciences, and order, transparency, justice, prosperity and stability in the world. This obviously calls for a procedure that universally and with necessity produces certain knowledge about the things, relations and laws of the world as well as the concerns of man and is capable of providing the basis for a just and humanistic society. I can't see anything wrong in this; quite on the contrary, it seems to me to be a highly desirable approach. Rationalism was grounded by Plato who used geometry and mathematics as an important starting point, as did Descartes. Geometry, in particular, serves as a domain of irrefutable logical-demonstrative reasoning and the best way to demonstrate the development, clearly visible to everyone, of hypothesis, idea and proof, that is, how to get, step by step, from a particular concrete geometrical body to universally valid insights and certain knowledge. In geometry, the logical and the intuitive elements combine in terms of visual thinking. Kant, too, sought to define the regular, or pattern-based, functions of our thinking, which we possess *a priori*, and to link them to a demonstrative-intuitive procedure for gaining certain knowledge, if only about the world of appearances. This combination of the logical and the demonstrative elements is the hallmark of the method of rationalism, for the demonstrative approach (as, for example, in geometry or in the game of chess) implies demonstrated reasoning that leads to

[340] Hegel, G.W.F., Inaugural Address, Delivered at the University of Berlin, 22 October 1818, Translated by H.B. Nisbet, 1999

the proof and is vividly accessible to everyone. Paul Natorp confirms Plato as the founder of the method in his Dialogues:

"*It must generally be emphasized that Plato, just as Descartes or Kant, deemed 'method' the supreme concern of philosophy and the sciences in general. Thus, along with a weaker suggestion in Meno (74 d), the concept and term of method is for the first time used in Phaedrus (270 de, 263 b).*"[341]

In her detailed study on Descartes and the development of his way of thinking, Lilli Alanen quite rightly notes that Descartes' method was basically developed and established as early as in his *Regulae* and was deepened and enhanced but never fundamentally altered in the further course of his philosophical thinking. Even in his later writings, e.g. the Meditations, the Discourse or the Principles of Philosophy, where his concern is more with metaphysics and the philosophy of consciousness, the basic ideas of his doctrine, such as, e.g., the innateness of the natural understanding that is needed for grasping the "simple natures," the importance of geometry, etc., not only remain unchanged but are even argumentatively substantiated in other respects. Also, there is no need to resort to biographical or historical facts to account for certain modifications in his later writings:

"*If so, there is no need to invoke, as commentators often do, any extra–philosophical, political, or pragmatic reasons to explain the concern with skeptical issues that are given such a prominent place in the Discours and the Meditations. They can be seen arising directly from the epistemology outlined in the Rules.*"[342]

Descartes explained his method in the four well-known rules published in his Discourse. Essentially, however, they were already in detail and very clearly set forth in his earlier *Regulae* (which, unpublished during his lifetime, were first published posthumously in 1701). These are:

1. "*The first was never to accept anything as true if I did not have evident knowledge of its truth: that is, carefully to avoid precipitate conclusions and preconceptions, and to include nothing more in my judgements than what presented itself to my mind so clearly and so distinctly that I had no occasion to doubt it.*"

Here, evidence, that is, intuitive insight, which comes to be expressed in the criteria of truth of "clear" and "distinct" (adequately differentiated), has a key methodical role. Avoidance of precipitation and preconceptions marks the researcher's critical attitude (today one would speak of avoiding a "bias"), and doubt is seen as a permanent critical corrective factor.

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341 Paul Natorp, Platos Ideenlehre, Eine Einführung in den Idealismus, Hamburg 2004 (1903), p. 64.

342 Lilli Alanen, Descartes's Concept of Mind, Harvard University Press Cambridge/ London 2003, p. 18.

This methodical doubt, however, is not a skeptical-destructive one, for it aims at *purifying* our thoughts of what is still un-*clear* or un-*clean*, thus leading to an increase in certainty. In a way, it can be regarded as an antidote against the Idols and biases which Francis Bacon had elaborated in his Novum Organum.

2. "*The second, to divide each of the difficulties I examined into as many parts as possible and as may be required in order to resolve them better.*"

By breaking down complex problems and confused questions Descartes seeks to create basic elements, as demonstrated above by the example of the equation, that are easy to comprehend as *simple natures*, e.g. structures open to the grip of the *natural light*, to be deciphered by certain, clear and adequately differentiated intuitive insight. This is the very procedure followed today in molecular biology where signaling cascades within the cell are deciphered level by level and step by step, thus building *chains of knowledge*. In logistics, the term "work streams" is currently used to denote such a splitting-up of complex projects. This procedure, too, does not really lend itself as a reason for EAN to condemn Descartes for, surely, everybody would seek to solve an equation term by term, break down a network of relations node by node, a chemical structure bond by bond, a project milestone by milestone.

3. "*The third, to direct my thoughts in an orderly manner, by beginning with the simplest and most easily known objects in order to ascend little by little, step by step, to knowledge of the most complex, and by supposing some order even among objects that have no natural order of precedence.*"

While this further enlarges upon the previous thought, Descartes now speaks of objects and how to gain knowledge about them, which quite clearly does not refer to a mystical external world behind a veil of ideas (as in the charge EAN philosophers keep raising against rationalism) but to concrete natural objects and an order among these objects that is initially hypothetically assumed, even where at first glance there seems to be no order at all, so the connections and relations among these objects can be step by step clarified. Descartes' philosophy obviously is a philosophy of *order* and *logical structure*; and one begins to see why he is so unpopular today.

4. "*And the last, throughout to make enumerations so complete, and reviews so comprehensive, that I could be sure of leaving nothing out.*"[343]

[343] René Descartes, Discourse on the Method, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 120.

This once more stresses the idea of lucidity, order, clarity and completeness. In contrast to some of his commentators, I feel that this is not a simple enumeration in the manner of a shopping list. I'd rather once more subscribe to the interpretation proposed by J.L. Beck who relates it to the image in Descartes' "Rules," i.e. that our intuitive, certain arguments are welded together in *logical chains* and, thus, build a direct *logical sequence* from the first simple nature that was grasped to the final result, the verification or rejection of the hypothesis.[344] J.L. Beck comments on this idea of the chain that expands into a network of chains as follows:

"*A truth may be not self-evident in itself and, as such, never capable of being apprehended immediately as self-evident; but it may be the necessary consequent of an* unbroken chain of self-evident truths, *or of a multiplicity of chains of self-evident truths, a network of chains, so to speak, through which our mind can pass with unbroken movement. Every step or link of the reasoning* is grasped by immediate intuition *and the conclusion is true without possibility of doubt or suspicion of error.*"[345] (my emphasis, WW)

This metaphor of the chain, or a network of logically built chains, quite adequately describes the approach and method of rationalism. This method is not about the quantitative accumulation of isolated data, associations, "matters of facts" of propensity and custom and even isolated observations with a *name* attached to them. It is about structures that are step by step expanded by the mind guided by its insight into the simple natures, it is about relations, systems, chains of logical steps that are captured by means of concepts of function and regulative ideas. A triangle is not an isolated dead thing to be copied by the senses but even at this level presents itself to the mind as an unbelievably complex system of relations among angles, sides, twenty special points such as the centroid, the circumcenter, the incenter, the Lemoine point, the Napoleon point, etc., all of which are hidden from immediate *sensory perception*. Triangle is not just a *name*, a particular image among other particular images à la Hume and Berkeley, it is always also a complex concept of function. What becomes obvious here is a last important aspect of rationalism. It has been acknowledged as a paradigmatic feature of Cartesian philosophy by Detlev Mahnke in his excellent study on Descartes:

"*Cartesian philosophy was essentially a philosophy of order. … There is a fundamental difference between 'ordre des matières' and 'ordre des raisons'. Accordingly, its knowledge is a chain of evident relations of cause and result … Objects as well as causes have a specific order that needs to be understood. This is what both terms have in common. The difference that Descartes sees between them must be rooted in the*

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344 This is Descartes' approach also in the *Discourse*, where he refers to the *geometers' long chains* where the arguments follow a logical order.

345 L.J. Beck, The Method of Descartes, The Clarendon Press, Oxford 1952, p. 115.

*different domains from which the respective order derives. What defines the order that is inherent in the objects must be different from the order of the causes.*"[346]

Through the analysis of and insight into these relations of objects, or between objects, universal and necessary knowledge can be obtained (the mind having sought and found self-assurance and anchorage in the cogito). In this, Descartes' starting point is geometry because it represents – as Plato already felt – much of what rationalism can rely on to adequately demonstrate the act of thinking. Rainer Specht has given a very insightful description of this "transition," in Descartes' thinking, from intuitive evidence to the grasping of geometrical figures and pure mathematical thinking to philosophy:

"*In Descartes' explication that scientific proofs are series of intuitively concatenated statements about intuitively grasped facts, "intuition" no longer means "visual perception" in general but "gaining insight." It no longer refers to perception by the senses but to perception by the understanding, no longer to the instable testimony of the eyes and the arbitrary findings of the imagination but to the immediately and effortlessly clear and distinct representation of a fact by the understanding.*"[347]

Having thus stood its test on the proving grounds, this fundamental procedure for gaining clear and distinct insight (Specht quotes from the Regulae, Chapter III, and the Discourse) is released for general use, and

"*… a fundamental procedure of geometry is applied to philosophy. The proofs of geometry are certain because they are grounded in facts that have been grasped as evident. Geometry requires evident intuition not only for simple statements but also for discursive procedures that rest on the assumption that an evident relation between evident individual statements that have been intuitively grasped is, in turn, intuitively grasped.*" (loc. cit.)

So, intuitive insight and deductive reasoning forge a chain of certain knowledge that, over time, evolves into a multitude of chains of logically linked insights that, in turn, gradually lead to a logically organized world. The visual element, the ideality of the figures (cf. the example of the circle), the relation between the drawn particular figure and the perfect universal idea of the figure, the evident provability of the hypotheses, the analytical method of proof, the necessity and universality of the laws and relations, the demonstrable reproducibility, the intuitive insight into elementary elements, the build-up from simple natures and the order of the

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346 Detlef Mahnke, Der Aufbau des philosophischen Wissens nach Descartes, München/Salzburg 1967, p. 17–23.

347 Rainer Specht, Pragmatische Aspekte der cartesischen Methode, in: Andreas Kemmerling, Hans-Peter Schütt (eds.), Descartes nachgedacht, Frankfurt/M. 1996, p. 11.

chain of demonstrable logical arguments for the conclusion are the hallmarks of the *rationalistic method*. Mahnke explains:

"*For him, the common practice of representation in geometry is characterized by two features: order ('ordo') and mode of proof ('ratio demonstrandi'). … The order of a mathematical proof ensues from its being evident; the relation thus established consists in a sequence of dependent and, in their dependency, evident reasons.*"[348]

As Mahnke notes, Descartes describes this procedure quite clearly in a letter to his friend Mersenne. In this letter, he also refers to the role that order plays in his methodical and rational approach:

"*It should be noted that throughout the work the order I follow is not the order of the subject-matter, but the order of the reasoning. This means that I do not attempt to say in a single place everything relevant to a given subject, because it would be impossible for me to provide proper proofs, since my supporting reasons would have to be drawn in some cases from considerably more distant sources than in others. Instead, I reason in an orderly way from what is easier to what is harder, making what deductions I can, now on one subject, now on another.*"[349]

Ernst Cassirer also highlighted *order* as a characteristic element of Descartes' thinking. Systematic thinking that is supposed to be both universal and necessary cannot be put into practice without order:

"*Only those propositions can be said to have a philosophical value and a philosophical relevance which can be brought into a systematic order. Order is the very condition of truth and knowledge; where there is no order there is no science.*"[350]

This reasoning leads to another two important reflections. The first concerns the aspect of order already referred to, the second the relevance of geometry for the transition to the order of things. The intriguing role of geometry in the light of the visual turn will be dealt with in more detail in a later chapter.

### Generally criticized points of classical rationalism

In spite of the immense attractiveness and potency of Descartes' grounding of modern western philosophy and its impact, through Arnauld, Spinoza,

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348 Detlef Mahnke, Der Aufbau des philosophischen Wissens nach Descartes, München/Salzburg 1967, p. 19.

349 To Mersenne, 24 December 1640, in René Descartes, The Philosophical Writings of Descartes, Vol. 3, The Correspondence, Translated by Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Anthony Kenny, Cambridge University Press 1991, p. 163.

350 Ernst Cassirer, Descartes, Leibniz, and Vico, in: Donald Phillip Verene (ed.), Symbol, Myth, and Culture, Essays and Lectures of Ernst Cassirer 1935–1945, Yale University Press 1981, p. 96.

Leibniz, Kant and Hegel, on the philosophy of the entire epoch of modernity, there is a number of critical, or frequently criticized, points in his philosophical construction that cannot simply be attributed to uncharitable or hostile interpretations. Regarding discussions about the *Meditations*, ambiguities were in part cleared up or at least addressed by Descartes in the answers and elucidations he offered in response to the objections raised by his critics. But sometimes Descartes' replies are polemical or caustic and do not give the reader the satisfactory feeling that the objection was indeed fully clarified and refuted. Also, critics sometimes fail to do justice to the *Meditations* as a *thought experiment* in the making, that is, as a chapter-by-chapter development, but keep insisting on arguments and observations that are initially set forth in Chapter II or III but are only clarified in Chapter VI since clarification depends on the insights gained in the chapters lying in between. Quoted out of context, and not treated at the level of reflection reached in the last chapters, the ideas introduced in the first chapters can indeed be "exploited" in ways that twist their meaning. On the whole, I feel that the strong focus of many commentators on the *Meditations* and the issue of the "cogito," or mind-body dualism, is too narrow an approach. I'd rather align myself with Stephen Gaukroger in this respect, who argues that Descartes was primarily concerned with mapping out a scientific explanation of the world (*Le Monde*) (albeit in the mechanistic view of the 17th century), and that the *Regulae*, the *Discourse* and, eventually, the *Principles* all serve the same purpose of developing (not unlike Kant) a certain, universal and necessary *method* for the sciences to build on, committed to the *Mathesis Universalis* and grounded in *reason* (the *natural light*). Here is what Stephen Gaukroger says:

"*I do not believe that the Meditationes should be read as a self-contained work, but rather as one which prepares the way for a full presentation of Descartes' metaphysically grounded natural philosophy. This is supported by the trajectory of Descartes' work both before the Meditationes – in the Discours and Essais, for example-and after it, in the Principia. And it will receive striking confirmation from Descartes himself, who, in conversation with Burman in 1649, tells him that: A point to note is that you should not devote so much attention to the Meditationes and to metaphysical questions, or give them elaborate treatment in commentaries and the like… They draw the mind too far away from physical and observable things, and make it unfit to study them.*"[351]

This being said, I would now like to list some of the key critical issues – e.g. the grounding and function of the *cogito* – which, while indeed of relevance for *rationalistic Neo-Kantianism*, are not the focus of the pre-

[351] Stephen Gaukroger, Descartes: An Intellectual biography, Clarendon Press, Oxford 1995, p. 362.

sent study. They are dealt with in the very insightful works of Gerhart Schmidt, S.V. Keeling, Dominik Perler, L. J. Beck or Harry G. Frankfurt, which offer a very careful and constructive examination of the subject, as well as in some more recent contributions to the discussion about how to deal with the problem of mind-body dualism.[352]

1. The reference to *intuition* and *intuitive insight*, that is, the immediate ("at once"), *clear* and *distinct* grasping of elementary logical relations that cannot be otherwise. This is often denounced as psychological and incomprehensible by EAN, and certainly remains an important objection that needs to be explored even though Locke and Hume, as we have shown, fully acknowledged *intuitive insight* as discovered by Descartes. On the other hand, Gewirth, Beck and others have already shown why, given the acceptance of innate faculties and dispositions, an element of necessity is indeed logically bound up with, or implicated in, the psychological element.
2. This, then, raises the question of the actual probative force of the two criteria of truth, *clear* and *distinct* (*adequately differentiated*, or *differentiated in keeping with their nature*), whose function entails a non-negligible burden of proof. Here, criticism abounds but – as Ansgar Beckermann's example has shown – use of this vocabulary is quite common among the proponents of EAN from Locke to the present day, as well as with Immanuel Kant who often refers to ideas as clear or obscure. Yet a detailed clarification of these key terms of Cartesian philosophy is imperative since they are the very basis of the theory of truth of *rationalism*. In Kant, the synthetic a priori judgments ensure an element of necessity in cognition, but access to a reality that can never be anything but appearance for us is nevertheless challenged. At any rate, I have not yet met with any form of insight, even in EAN, that was clearer than *clear* and more distinct than *distinct*.
3. The apparent dualism of *res cogitans* (defined by Descartes in the second Meditation as the *mind* or the *understanding*) and *res extensa*, the extended world that contains the body and, thus, the position and foundation of the *external world*, is another often-criticized point, additionally complicated by the problem of *God* as the guarantor of the linkage, or cohesion, of *res cogitans* and *res extensa*. I have

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352 Gerhart Schmidt, Aufklärung und Metaphysik, Die Neubegründung des Wissens durch Descartes, Tübingen 1965. S.V. Keeling, Descartes, Oxford University Press, London 1934. Dominik Perler, Repräsentation bei Descartes, Frankfurt/M. 1996. Harry G. Frankfurt, Demons, Dreamers & Madmen, Princeton University Press, Princeton 2008. On "dualism": Alessandro Antonietti, Antonella Corradini, E. Jonathan Lowe (eds.), Psycho-Physical Dualism Today, Lexington Books, Ply-mouth 2008. John Foster, The Immaterial Self: Defence of the Cartesian Dualist Conception of the Mind, Routledge 1996.

already argued above that whenever Descartes relies on the concept of God in his argumentation I will throughout this book replace it by the biological-cultural developments of nature or evolutionary history and, thus, invalidate EAN criticism in this respect. That the philosophers of rationalism do not deny the real world of things has already been made clear. But Descartes himself has created a certain amount of confusion by putting too much stress on his discovery that *for us*, the world represented by us must stem from self-conscious thinking and that the mind, in turn, is essentially *spontaneous*, *creative* and *autonomous* and, moreover, utterly *different* from all the concretely existing extended substances, which induced him to accord the status of a distinct and "*completely different*" *substance* to it. By this, he provided a point for attack for all those who believe that we are able to *directly*, *immediately* and *completely* know the things of the external world *in themselves*. Descartes' discovery of the *cogito* was eventually further developed by Kant, for whom "… *the synthetic unity of apperception is the highest point to which one must affix all use of the understanding, even the whole of logic and, after it, transcendental philosophy; indeed this faculty is the understanding itself.*"[353] And while the habitual EAN "ritual of attack" with respect to Descartes's ordering of *res cogitans* and *res extensa* has been and is still being reenacted over and over again, EAN authors still deliberately ignore what John Locke wrote on this issue; which is as follows:

"*The same happens concerning the operations of the mind, viz. thinking, reasoning, fearing, etc. which we concluding not to subsist of themselves, nor apprehending how they can belong to body, or be produced by it. We are apt to think these the actions of some other* substance, *which we call* spirit*; whereby yet it is evident, that having no other idea or notion, of* matter, *but something wherein those may sensible qualities, which affect our senses, do subsist; by supposing a* substance, *wherein thinking, knowing, doubting, and a power of moving, etc. do subsist, we have as clear a notion of the* substance of spirit, *as we have of* body*; the one being supposed to be (without knowing what it is) the substratum to those simple ideas we have from without; and the other supposed (with a like ignorance of what it is) to be the substratum to those operations, which we experiment in our selves within. 'Tis plain then, that the ideas of corporeal substance in matter is as remote from our conceptions, and apprehensions, as that of* spiritual substance*, or* spirit*; and therefore from our not having any notion of the substance of spirit, we can no more conclude its non-existence, than we can, for the same reason, deny the existence of body: It being as rational to affirm, there is no body, because we have no clear and distinct idea of the substance of matter; as to say,*

[353] Immanuel Kant, Critique of Pure Reason, Cambridge University Press, 1998, note B 134, p. 247.

*there is no spirit, because we have no clear and distinct idea of the substance of spirit.*"[354] (my emphases, WW)

Here, Locke unequivocally refers to "… *some other substance, which we call spirit*," according it the status of a "thing in itself" just as he had already accorded it to the external substance which, for him, includes the *body*. In this, Locke seems to adhere to Descartes' differentiated view of the mind and the external world of things, the difference being that unlike Descartes, he refrains from any final authoritative statement – "*entire ignorance concerning the nature of the substrate*" – and treats *substance* and *spirit* as "things in themselves" about which, except for perceptions in terms of "simple ideas," we can know nothing. At any rate, the "arch empiricist" Locke literally speaks of the "*substance of spirit*"; a fact that seems to have gone unnoticed by EAN authors so far, or has been considered nothing to worry about?! Descartes' concept of *res cogitans* is often criticized for introducing a thinking substance, whereas I read it as an independent entity which can't be reduced to the (physical) laws of the material world. Similarly, *res publica* doesn't mean a material substance one could touch with one's hands.

From the perspective of *rationalistic Neo-Kantianism*, thinking, or cognitive structures and the mind, must be understood in terms of their biological-cultural evolutionary development. But once human self-consciousness, the human mind, has formed as a novel quality in evolution, once this unbelievable quantum leap has happened, the mere physicalistic-scientific approach simply no longer suffices as an adequate way of accounting for this phenomenon. There seems to be a suddenness in the emergence of the spontaneous and self-conscious mind that is not unlike the suddenness with which, at the cinema, we are plunged into supreme horror when Frankenstein's monster suddenly develops an unforeseeable life of its own or HAL, the spaceship's computer in Stanley Kubrick's masterpiece "2001: A Space Odyssey," begins to react in his own interests (an effect that will become even more dramatic once *artificial intelligence* starts evolving into an uncontrollable life of its own). You cannot account for man's spontaneous, creative, self-conscious self with a physicalistic theory, this is what Descartes has primarily sought to make clear by his intelligent differentiation between the natures of the mind and the body, which are precisely this: "*completely different*." Whoever suspects him of seeking to simultaneously introduce the notion of an *immaterial soul* would be well advised to consult the many passages where Descartes always speaks of the *natural light*, the light given by *nature*, of the *germs* and

[354] John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II xxiii 5, p. 181.

*seeds* of reason. Thus, referring to how thoughts are remembered, he notes that

"*… it is necessary for some traces of them to be imprinted on the brain; it is by turning to these, or by applying itself to them, that the mind remembers*."[355]

These are not the words of someone who posits spirits or phantoms, but who is well aware, from his anatomical dissections, that the brain is the basis of thought – and that nevertheless the mind is "*completely different*"! In this sense, Descartes emphasizes that "[t]*here are two facts about the human soul on which depend all the knowledge we can have of its nature. The first is that it thinks, the second is that, being united to the body, it can act and be acted upon along with it*."[356]

This is essentially an adequate scientific attitude, the way of the sciences: when novel complex phenomena appear and cannot be explained, novel and better theories will be developed. When particle physics, for instance, was confronted with phenomena such as uncertainty, and with paradoxes that conventional mechanics were unable to explain, a *wave-particle duality* was conceived, and fully assimilated in physics, without the world getting out of joint or somebody being stylized as the arch villain.

Let's briefly consider *Dominik Perler's* perspective on this issue. He is one of the rare exponents of analytic philosophy who approach Descartes' dualism thesis with an open mind and on a par with Descartes' own argumentation. Perler starts from the assumption that Descartes conceives of these two types of substances as actually and not just conceptually different. But, he cautions, before engaging in an analysis of his reasoning we should keep in mind

"*… that Descartes stands for a very specific form of dualism. He only asserts that there are two types of substances that have different attributes. He does not assert, unlike what is sometimes imputed to him, that there are two different worlds, that is, a world of mental objects (thoughts, sensations, pains, etc.) and a world of corporeal objects (tables, trees, human bodies, etc.). … One should further note that Descartes is not seeking to prove the actual difference between completely independent substances*."[357]

Thus, Descartes is essentially concerned with establishing the *actual difference* between two realms that by their very nature are simply different,

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355 René Descartes, Meditations on First Philosophy, Author's Replies to the Fifth Set of Objections, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 247.

356 To Princess Elizabeth, 21 May 1643 (AT III, 663–668), in: René Descartes, The Philosophical Writings of Descartes, Vol. 3, The Correspondence, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Anthony Kenny, Cambridge University Press 1991, p. 217f.

357 Dominik Perler, René Descartes, München 2006, p. 168f.

and functionally and epistemically governed by different laws. He describes the human body as a material and physiological system, and there is no doubt for him that ideas (in accordance with the state of knowledge of his time) are based on processes in the nerves and the brain, with no ghosts being involved! In the *Discourse*, the *Second Meditation* and the *Principles*, he then proceeds to further substantiate his proofs that these two entities are really different. It is very important not to draw premature conclusions from the first sections of the Meditations because the Meditations, being a *thought experiment*, follow a continuous line of reasoning that only gradually and towards the end leads to the desired insights and results. Perler:

"*Descartes presents his ultimate and much more subtle proof at the end of the argumentation in the Sixth Meditation and, in a short version, in the appendix to the Author's Replies to the Second Set of Objections, … the argument of clearness and distinctness*."[358]

For it is Descartes' aim to *define* the body and the mind, or *res extensa* and *res cogitans*, by their *nature*, that is, to adequately *distinguish* them by what they essentially are, as expressed by the criteria of clearness and distinctness.

"*More concretely, this means: I understand the mind as a complete thing when I understand it as a thinking thing, and I understand the body as a complete thing when I understand it as an extended thing*."[359]

Thus, both substances – or perhaps more to the point: both *entities* – are defined in their *specific nature* and recognized as substantially *different*. Furthermore, in the sixth, and last, Meditation, the self-investigating self-consciousness understands

"*…, that I am not merely present in my body as a sailor is present in a ship, but that I am very closely joined and, as it were, intermingled with it, so that I and the body form a unit. … that my body, or rather my whole self, in so far as I am a combination of body and mind, can be affected by the various beneficial or harmful bodies which surround it*."[360]

This, Descartes notes in this context, is our "*nature*," "*my whole self, in so far as I am a combination of body and mind*." It is a "*unit*" formed by the mind *and* the body. Both components of this unit, however, are "*completely different*" by their nature – a thought is not a piece of matter –, and yet the

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358 Dominik Perler, René Descartes, München 2006, p. 173.

359 Dominik Perler, René Descartes, München 2006, p. 176.

360 René Descartes, Sixth Meditation, in: René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 56.

only starting point for me to think the body. Since self-conscious thinking, the cogito, the only certain *starting point* of thinking, can always only be *in the medium of thinking*, there is no other way for us to define our own ideas and even our own bodies but by thinking, there is no other origin for us to start from. How could this be otherwise? I can't find anything illogical or inconsistent, let alone objectionable, in this reasoning. The mind and the body of man form a "*unit*," yet the two components are "*completely different*," and my thinking and describing this unit can only begin with the mind because only the mind can think. That's all.

Of course, generations of critics have noticed that these two essentially different entities, both of which are present in one *person*, one individual, must *causally interact* to fulfill their essential task, which is to live, move and think. So the problem here is the problem of interaction of the two entities:

"*How is it possible for two actually different substances with different attributes to be in a causal relation with each other*?"[361]

For *Gilbert Ryle* and *Anthony Kenny*, in particular, this was the point to insist on because they believed that it at last enabled them to once and for all convict Descartes and burn him on the philosophical stake of EAN, or for rationalism to be "*decapitated*" for good. Regarding this tendentious criticism, Gordon Baker and Katherine Morris, two more modern commentators, note:

"*The entrenchedness of the Cartesian Legend in Anglo-American philosophy is arguably a by-product of a set of unnoticed and unexamined assumptions that shape modern philosophy of mind and cognitive science.*"[362]

Scrupulously researched in many a point, their work radically contradicts the popular criticism of Descartes as constructed by Ryle, Kenny, Russell, Williams and others. Another often-advanced criticism is that Descartes apparently fails to sufficiently respond to, or refute, certain objections.[363] Dominik Perler comments on this situation as follows:

"*On closer examination of Descartes' texts, however, it becomes evident that when he does not offer an explication, this is rather due to his belief that the problem the commentators feel to be in need of explanation does not exist, in the first place*."[364]

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361 Dominik Perler, René Descartes, München 2006, p. 180.

362 Gordon Baker, Katherine J. Morris, Descartes' Dualism, Routledge London/New York 1996, p. 9.

363 A case in point: Jaegwon Kim, Philosophy of Mind, Westview Press, Boulder, Colo. 1996, p 36ff.

364 Dominik Perler, René Descartes, München 2006, p. 181.

This again highlights the interesting problem that those who posit a simple *causal* interaction on the model of a pocket calculator between the body and the mind invariably expect to see a *one-dimensional*, *monocausal stimulus-response interaction* between biological structures and thoughts; which, however, can never happen like that in a self-conscious, creative, spontaneous being. The mind is precisely not a primitive machine, a pocket calculator. But the "otherness" inherent in this divergent approach is not even addressed in EAN. Rather, Descartes is condemned because his doctrine is fundamentally different in nature from what the *stimulus-response* or *pocket-calculator philosophers* expect. As it is, the situation is not unlike that of a witch trial: if the witch goes down and drowns, she is innocent, if she resurfaces and gasps for air, she is guilty and will burn. Perler then proceeds to a closer examination of the *interaction problem*:

"*The causal relation between the two substances must not be naively conceived of as a physical contact. When the body causes something in the mind, this only means that a certain state of the body is followed by a certain state of the mind. In the* Principia*, Descartes explicitly notes that the affects or thoughts of the mind follow on states of the brain, or that the body may cause the mind to have certain thoughts*."[365]

And in the *Sixth Meditation*, Descartes notes that certain corporeal states *correlate* with certain mental states. Descartes sometime points at the practical experience, when asked for an explanation of the mind-body interaction, which sounds strange at first. But there is indeed a causal interaction between the mind and the body but this interaction must not be conceived of on the primitive model of stimulus and response. Rather, it is a complex, creative interaction in accordance with the specific *nature of the mind*, as illustrated by the example given earlier in this book: tapping a person's shoulder with one's finger will trigger off, via the afferent nerves, a physiological chain of reactions to the brain, all of which is fully explained by physiological causality. But the same physiological stimulus that, from a neurological perspective, triggers a response in the brain, only "*correlates*" with the effect in the mind. And thus the tap with one's finger can be *represented* as a greeting, a warning, as sexual harassment, a signal, a gag, a manifestation of power, as maternal affection, and so on. There is a complex relation, a *correlation*, that is nothing to do with the primitive one-dimensional stimulus-response pattern. This is the reason why those philosophers who seem to delight in exorcising the mind tend to use pain as an example (e.g. Wittgenstein) because the representation of pain appears to be relatively one-dimensional and unmediated, which serves to sustain the illusion that with pain, there is no such thing as representational modification by the mind but a direct and monocausal fact. But here, too, EAN suffers shipwreck because even the way pain is represented

[365] Dominik Perler, René Descartes, München 2006, p. 183.

is differentiated and changes from the infant to the adult. What in the infant is a diffuse sensation of abdominal pain becomes, in the adult, a dull colicky pain in the right upper abdominal quadrant, put down to the eating of that fatty roast. And this also holds for the opposite direction, i.e. from the mind to the body. All of which goes to show that the mind-body interactions are just as multifaceted, complex and multi-dimensional as thinking – the mind – in general is. Any monistic or reductionist approach by far underestimates the complexity of their actual relations. This is what Descartes already figured out 370 years ago.

To conclude with the issue of *dualism*, I'd like to quote from a book by Peter J. Markie, "*Descartes's Gambit*," a study meticulously conducted, step by step, in the way of the linguistic-analytic method. In the Conclusion that sums up his analysis in Part Two, he offers a number of important observations:

"*Nonetheless, Descartes derives the second part from the first part, and the first part from his theory of self-knowledge. He does so without the blunders so often attributed to him. He does not beg the question, misapply the principle of the indiscernibility of identical, or incorrectly infer de re propositions from their de dicto counterparts. His reasoning is impeccable; his assumptions are not outrageous, especially when considered in themselves rather than with an eye to where they ultimately lead in the context of the rest of his philosophy. Descartes's development of his theory of the self is a fine example of how a moderate, at base almost commonsensical, philosophical position can be radicalized.*" His final résumé at the end of his book is: "*I have shown that Descartes does not just assume his versions of attribute and substance dualism or fall into them by a logical blunder. He reasons his way to them by an insightful strategy that frequently generates strong arguments. His arguments give us good reason to consider more carefully how a correct account of self-knowledge may commit us to substantive conclusions about nature.*"[366]

Markie's study shows that Descartes' logic and doctrine are so powerful that they still bear the scrutiny of linguistic-analytic experts and remain fully defensible even hundreds of years after being written. Likewise, *rationalistic Neo-Kantianism* is a system where thinking starts out from itself but learns to understand its own biological roots by exploring *nature* in a way that is *rational* and in accord with its own *nature* as a mind, recognizing that while it is naturally based on the biochemical processes of the brain, while it is also "bio-*logy*," it is at the same time a spontaneous, creative and self-conscious. It is precisely these *two dimensions* that are expressed by and integrated in the term of *rationalistic Neo-Kantianism*. So, as for clarifying the mind-body "dualism" as far as this is possible in the present context, this should suffice, for in actual fact, it is not a problem at all but a highly intelligent presentation of this complex relation from the

[366] Peter J. Markie, Descartes's Gambit, Cornell University Press, Ithaca/London 1986, p. 269f.

vantage point of thinking man. Of course, there will still be inadequate books such as "Descartes' Error" by Antonio Damasio.[367] But there are more and more voices to the contrary, also from the realm of research, such as that of Stanislas Dehaene, one of today's leading neuroscientists:

"*The idea that the mind belongs to a separate realm, distinct from the body, was theorized early on, in major philosophical texts such Plato's Phaedo (fourth Century BC) and Thomas Aquinas's Summa theological (1265–74), a foundational text for the Christian view of the soul. But it was the French philosopher René Descartes (1596-1650) who explicitly stated what is now known as dualism: the thesis that the conscious mind is made of a nonmaterial substance that eludes the normal laws of physics.*

*Ridiculing Descartes has become fashionable in neuroscience. Following the publication of Antonio Damasio's best-selling book Descartes' Error in 1994, many contemporary textbooks on consciousness have started out by bashing Descartes for allegedly setting neuroscience research years behind. … Descartes's dualism was no whim of the moment – it was based on a logical argument that asserted the impossibility of a machine ever mimicking the freedom of the conscious mind.*"[368]

Thus, in the final analysis, there are four relevant points that still need to be clarified:

1. The innateness of the "*natural light*," also called the natural instinct of "*good sense*" by Descartes who thus laid the groundwork for modern *nativism* (and which is one of the important issues of this study).[369] That a definitely biologistic perspective can indeed be imputed to Descartes is shown by his 1693 letter to Mersenne, already referred to above and also quoted by L.J. Beck: "*I distinguish between two kinds of instinct; one belongs to us in so far as we are men and is of a purely intellectual nature: this is the natural light or* intuitus mentis *on which I hold that we should alone rely; the other instinct is in us in so far as we are animals and consists of a certain natural impulsion for the conservation of our bodies… .*"[370] Beginning with John Locke, nativism has been one of the main points of attack for EAN philosophers, which is not a bad thing at all since this is one of the two fields where

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367 Antonio R. Damasio, Descartes' Error: Emotion, Reason and the Human Brain, Putnam's Sons, New York 1994.

368 Stanislas Dehaene, Consciousness and the Brain, Penguin Books New York 2014, p. 3.

369 René Descartes, Discourse on the Method, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985. The Discourse opens with the words: "Good sense is the best distributed thing in the world … It indicates … that the power of judging well and of distinguishing the true from the false – which is what we properly call 'good sense' or 'reason' – is naturally equal in all men…"

370 L.J. Beck, The Method of Descartes, The Clarendon Press Oxford 1952, p. 63.

due to scientific progress, EAN is sure to lose the "*war*" John Locke started. But this will be explored in detail in the respective chapter.

2. Rationalism's alleged denigration of sensory perception and overemphasis on pure reason. That this charge is completely beside the point and that sensory perception is indeed seen as the indispensable, if lowest, initial stage of knowledge has, I believe, been clearly shown in the above and should no longer be an issue in the further development of this study.
3. Some uncertainties in Descartes' view of the function of the idea and the *concept of idea*. The concept of idea in Descartes and the subsequent Cartesian philosophers, e.g. Arnauld, is very multifaceted, and sometimes unclear;[371] which, by the way, is also true for the somewhat different use of the terms of *simple* and *complex ideas* in John Locke and David Hume, where little or nothing is left of Plato's concept of idea. The famous wax argument of Descartes' *Second Meditation* is a case in point. Having detailed the changes that can be observed, i.e. perceived by the senses, when the wax is exposed to different temperatures, Descartes comes to the conclusion that the primary nature of the wax is its extension, that is, the extension of the body that can be mathematically described. This is one of the few points where I feel he is in error, which leads to the very complicated debate about *primary* and *secondary qualities*. What could have been derived from the wax argument is, rather, the *concept of function*, meaning that what really counts is precisely what is *non-observable*, i.e. the dynamic-functional concept of wax, its *plasticity*, its changeability and polymorphism. Following Ernst Cassirer, we will in the last chapter of this study discuss the meaning of the *concept of function*, which is fundamentally different in structure and quality from the nominalist EAN concept.
4. The "detachment" of the mind from the world of real things and the "danger" of idealistically conceiving of ideas as an autonomous emergence, with no roots in reality and nothing in common any more with the real world (see the quotation from Russell earlier in this book). While this charge can at times be raised against some metaphysicians, it is so highly absurd when raised against Descartes that it seems imperative to deal with it right away. In the history of philosophy, if not in the history of humanity in general, no other universal genius has arguably contributed more to progress in so many fields of knowledge than Descartes has. And this at a time when thinkers

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[371] Cf. eminent works such as, for instance, Steven M. Nadler, Arnauld and the Cartesian Philosophy of Ideas, Manchester University Press, Manchester 1989, or Dominik Perler, Johannes Haag (eds.), Ideen, Repräsentationalismus in der frühen Neuzeit, Berlin/New York 2010.

were still persecuted by the Inquisition and burnt at the stake, such as, for example, the philosopher Vanini who as late as in 1619 was burnt for impiety in Toulouse after having his tongue torn out. At the time, Descartes had enriched, if not established, the fields of philosophy, mathematics, physics, music, geometry, geology, astronomy, optics, medicine and many other fields of knowledge. Descartes is the founder of *analytic geometry*, of the *coordinate system* with its x-axis and y-axis, he introduced the standard notations for unknown quantities – x, y, z – that are still in use today; he extended the solution of cubic equations, he solved Pappus' geometrical problem, he conducted mathematical studies in the theory of music, and much else – Stephen Gaukroger offers an exemplary documentation and reconstruction of all these undertakings.[372] In addition, Descartes was the first to publish the *law of refraction* and proposed a groundbreaking theory of vision with fascinating drawings and sketches of optical instruments (his *Optics*). He was also the first to describe *shape* and *size constancy* in perception, prompting the following commentary by Richard Gregory, one of the leading researchers in the theory of perception:

"*René Descartes, perhaps the most influential of modern philosophers. It is now difficult to escape from his duality of mind and matter, which permeates almost all modern thought in psychology. He clearly described perceptual size and shape constancy, long before they were studied experimentally.*"[373]

Descartes often conducted anatomical sections on animals and bought animal heads and innards at a butcher's in order to better understand the physiology of animals. He wrote a treatise on animals, developed two procedures for demonstrating that machines and animals do not have a creative mind, in contrast to man who has reason as his "*universal instrument*,"[374] and he of course wrote his well-known *Treatise on Man*. He described the mechanical functions of the pulley and of machines of all sorts, and all this in parallel with his philosophical activities. He alone

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372 Stephen Gaukroger, Descartes: An Intellectual Biography, Clarendon Press, Oxford 1995.

373 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 224.

374 These procedures are, firstly, that animals are unable to respond linguistically depending on the situation (e.g. a parrot learns words but cannot creatively vary them), and, secondly, that animals are specialized in certain performances but fail in others, that is, are not universally endowed with reason. René Descartes, Discourse on the Method, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 139f. Cf. also: Dominik Perler, Markus Wild, Der Geist der Tiere, Frankfurt/M. 2016, p. 38f.

certainly conducted more *scientific experiments* than all the EAN philosophers combined, notwithstanding their grandiloquence about experimenting! Just take John Locke, for example, preaching experiment and observation – how many scientific studies did he publish? How many scientific disciplines did he establish, what scientific methods did he discover? Worse still, David Hume, always so apodictic and suggestive when it comes to observation and experiment. Actually, the only thing he ever observed was he himself! The very person who demanded that all books that failed to comply with his criteria be "committed to the flames." Hume only ever fantasized about experiments and observations, he never conducted a single experiment, he never did any scientific work! All of what Locke and Hume expounded in their writings was based on their naïve self-observation, all their experiments were "one-man experiments," as it were, from which, however, they drew general conclusions for human thinking in general, an approach that has also been extensively criticized by John Yolton.[375] The best-known example of this misguided "one-man self-observation" typical of Hume and the absurd results which, unsurprisingly, follow from this radical application of the empiricist principle, is the famous passage in his *Treatise* where he laments that strive as he may, he will never be able to observe a self – himself – in itself/himself.[376] John Jenkins has commented on this with the finesse of which only the English language with its understated sense of humor is capable:

"*Now of course we may want to say against this that it is empiricist consistency at the expense of common sense. If Hume could not find the inner self, then surely this was because, by definition, the self was doing the searching and it could never reveal itself in such a process – any more than a torch beam will shine upon the torch*."[377]

As Norman Kemp Smith, who repeatedly caricatured Hume's would-be experimental attitude, notes:

"*He accepted with an all too easy conscience the loose ends of doctrine in which his 'experimental' method was repeatedly landing him.*"[378]

Descartes of course still adhered to a mechanistic conception of the world that sometimes resulted in erroneous assumptions, he committed errors and drew the wrong conclusions from correct observations. Thus, he assumed that the imagination of man was located in the pineal gland

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375 John W. Yolton, The Concept of Experience in Locke and Hume, in: Journal of the History of Philosophy, Vol. 1, No. 1, October 1963, pp. 53–71.

376 David Hume, A Treatise of Human Nature, Oxford University Press 2007, p. 171–173.

377 John J. Jenkins, Understanding Locke, Edinburgh University Press, Edinburgh 1983, p. 97.

378 Norman Kemp Smith, The Philosophy of David Hume, Palgrave Macmillan 2005 (1941), p. 59.

(glandula pinealis). Of course he was wrong, and today we know that the pineal gland produces melatonin but is nothing to do with the visual process and the imagination. But why did Descartes assume this? From the anatomical studies conducted for his Optics he knew that the pathways of the optic nerves in the brain cross to the opposite cranial side while our field of vision is nevertheless consistent. This is why, or so I presume, he looked for a structure in the anatomically posterior region of the brain, where the optic nerves go, that was not paired (as the hemispheres are) but unitary. And apparently, all he found in his anatomical sections of that region was the pineal gland. This was erroneous, to be sure, but it was a misconception that was deduced from his anatomical and optophysiological studies rather than the result of fantasy. In medical science, there have always been, and still are, erroneous theories that are propagated for some time. For example, gastric ulcers were until well into the 1980s assumed to have psychosomatic or genetic causes because their real cause, the bacterium *helicobacter pylori*, was unknown. But, as stated above, for all their mantra-like preaching of *experiment* and *observation*, the majority of EAN philosophers are not fit to hold a candle to Descartes in this respect, for he was a philosopher *and* a scientist! Richard Watson's appreciation of Descartes' influence is certainly more adequate here, even though he still tends to overemphasize the technical-deductive aspect at the expense of the intuitive-creative one. Reading this passage, one spontaneously understands why Descartes' work was put on the index of the Church, just as it is today on the "index" of EAN:

"*René Descartes, the Father of Modern Philosophy, one of the greatest mathematical geniuses who ever lived, laid the foundations for the dominance of reason in science and human affairs. He desacralized nature and set the individual human being above church and state. Without Cartesian individualism, we would have no democracy. Without the Cartesian method of analyzing material things into their primary elements, we would never have developed the atom bomb. The seventeenth-century rise of Modern Science, the eighteenth-century Enlightenment, the nineteenth-century Industrial Revolution, your twentieth–century personal computer, and the twenty-first-century deciphering of the brain – all Cartesian. The modern world is Cartesian to the core – this world of high technology, mathematical physics, calculators and robots, molecular biology and genetic engineering – a world in which deductive reason guides and controls not only our science, technology, and practical action, but most of our moral decisions as well.*"[379]

And as Norman Kemp-Smith rightly points out:

[379] Richard A. Watson, Cogito Ergo Sum, The Life of René Descartes, David R. Godine, Boston 2007, p. 3.

"*He was a pioneer, adventuring into territories large tracts of which, even now, three hundred years after his death, are still terra incognita.*"[380]

So, what remains of the flaws and points of criticism of rationalism are four issues that a *rationalistic Neo-Kantianism* is called upon to further clarify and put on a more solid foundation. The first two are closely linked and concern the demonstration of *intuitive evidence*, the intuitive insight of rationalism, and the criteria of truth – *clear* and *distinct* (*adequately differentiated*) – that Descartes associated with them and that were already criticized by Leibniz as too vague. At the same time, the *visual thinking* of *simple natures* needs to be differentiated from the *imagination* that is later brought into play in the Meditations. This will be explored in detail in the following main chapters. The third decisive arena is the debate about *innate principles* and *ideas*, which will be addressed in yet another chapter. If as a result of the visual turn, these points of criticism can be successfully validated and argumentatively reinforced, the foundation of *rationalistic Neo-Kantianism* will be philosophically substantiated and will become highly attractive as the philosophy of the 21st century.

### Empiricism, Analytic Philosophy, Naturalism (EAN)

In this subchapter, I will focus on the core tenets of *empiricism*, or EAN, since a more comprehensive history and criticism of all their inconsistencies and misconceptions would go far beyond the scope of the present study. Whoever is interested in a comprehensive criticism of empiricism and EAN in general will find all the essential arguments in Ernst Cassirer's "The Philosophy of Symbolic Forms" as well as in his writings of the 1920s, such as, for instance, "*Zur modernen Physik*."[381] Cassirer took the trouble to examine the inconsistencies of the empiricist or, at the time, positivist positions and arguments to the last detail and in keeping with the state of research of his time, exposing them in virtually all relevant domains from the sensory physiology of vision, hearing and smell to modern physics; an undertaking that has received far too little attention. This may be because his famous three-volume *magnum opus*, "*The Philosophy of Symbolic Forms,*" has mainly been received as a culture-theoretical symbol theory and a theory of signs (that is, of language) while Cassirer's steady and comprehensive dismantling of empiricist and positivist positions has been largely ignored (an exception being e.g. "*Cassirer und die Formen des Geistes*" by Guido Kreis). As for *gestalt theory* it can be assumed that Cassirer was indeed aware of its potential as a biological-

380 Norman Kemp Smith, New Studies in the Philosophy of Descartes, Macmillan & Co London 1952, p. 324.

381 Ernst Cassirer, Zur modernen Physik, Darmstadt 1987.

psychological foundation for epistemology and as a theory that was based on practical-logical considerations and had already uncontrovertibly acknowledged that the actual process of sensory perception was substantially at odds with the models proposed by empiricism. But gestalt theory was still too new and politically too weak to pit itself against the rising "hype" of positivism: its psychological experiments were dispensed with as too inconclusive and vague, psychological knowledge was still insufficient, as compared to its present-day potential, to provide a scientific foundation for the rationalistic conception of sensory perception; and, last but not least, the major exponents of gestalt theory were persecuted and murdered or forced into emigration and dispersal by the Nazi regime.[382] However, feeling that gestalt theory did offer a valid alternative, Ernst Cassirer integrated it into his theory of symbolical forms under the heading of "symbolic pregnance"; a concept whose relevance for *visual thinking* will be discussed at the end of my study.[383] But let's get back to empiricism. Regarding the subject matter of the *visual turn*, there are *three central problem areas*, or fundamental flaws, of the empiricist, or EAN, doctrine that are of special interest:

1. *Firstly*, empiricism's *theory of perception*, that is, more specifically, the concept of "*simple ideas*" (e.g. "*simple ideas*" and "*complex ideas*" in Locke) and its role in the direct reception of the sense experiences (*sensations* in Locke, *impressions* in Hume) that come rushing in from the external world and, furthermore, the position of these "*simple ideas*" – supposed to be the "*material*" of our knowledge – with regard to the "*operations of the understanding*." It is a concern of this book to show that the EAN *theory of perception* breaks down at *two* essential levels: *firstly*, at the level of the "*theory of ideas*," that is, the initial assumption that perception is basically a *passive*, *atomistic* "copying" of *impressions* or *sensations* rather than the result of a highly complex, active, structuring, interpretative computation in terms of our visual cognition. *Secondly*, at the level of the formation of objects and concepts, which is not a simple mechanism of assembling preformed, ready-made "building blocks" but an active *figurative synthesis* of appearances where the formations created by the imagination are transformed into *schemata* and, ultimately, *concepts*, as set forth by Immanuel Kant in his *Critique of Pure Reason*.

2. Secondly, the epistemology of empiricism (and thus of EAN in general) was placed in a hopeless plight by its categorical *rejection of innate principles and ideas* (e.g. Locke), that is, its general rejection of innate

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382 For a detailed and stringent reappraisal of Cassirer's relation to gestalt theory and his conception of symbolical pregnancy as a form of representation, see Guido Kreis, Cassirer und die Formen des Geistes, Frankfurt am Main 2010.

383 Ernst Cassirer, The Philosophy of Symbolic Forms: The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 202.

knowledge, which will be the subject of a later section. Here again, my aim is to show that the unfortunate EAN misdirection is due to the one-hundred-percent anti-nativist dogma established by Locke, and that the clearly *innate* parts of our knowledge have until very recently been simply negated, ignored and denied. As a result, EAN had to concoct ever more twisted versions of Locke's doctrine rather than simply accept that due to the evolutionary development and genetic make-up of man there is a certain range of dispositionally innate faculties and dispositionally innate knowledge. It is only quite recently that some change in this matter can be observed – paradigmatically in Carruthers.

3. The third essential deficiency follows from deficiencies 1. and 2., namely EAN's *inconsistent* and *misleading theory of abstraction*, that is, their way of bridging the hiatus between the unstructured and allegedly passively received *sense experiences* and the *abstract* and *general concepts* that are supposed to emerge from them; i.e. the question of how to get from sense experiences and impressions (images) that are always particular and different to concepts that are *universal* and *abstract* and, then, to complex theoretical structures when there is no structuring, no innate knowledge, no "*preinstalled program*." Or, in still other words, how to get from myriads of *impressionist* sense experiences and the *mind as a blank slate* to *universal* ideas such as "round" or "red" or, even more unlikely, abstract concepts such as "value," "generalization" or "due diligence obligations" and, then, general theories and universal laws.

Methodologically, these three points are, of course, closely interconnected, for if, for instance, it cannot be demonstrated in due form that the "simple ideas" are given with the particular *sense experiences* while the dogma is adamant that innate knowledge cannot exist, then there is no way to get to abstract concepts, universal ideas and laws other than by subreption. Inversely, if there were no a priori universal structures, gestalts or categories, there would be no way for us to synthesize the individual *sense experiences* that are randomly streaming in into universal ideas because in terms of *sense experience*, the perfectly circular or the perfectly square simply do not exist in this pure form. These problem areas of the empiricist doctrine will be primarily, and concretely, presented and discussed on the basis of John Locke's "*An Essay Concerning Human Understanding*"[384] and David Hume's "*A Treatise on Human Nature*"[385] and "*An*

[384] Quoting from: John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008.

[385] Quoting from: David Hume, A Treatise of Human Nature, Oxford University Press 2007

*Enquiry Concerning Human Understanding*."[386] This seems justified in so far as John Locke is generally seen as the "*founder of modern empiricism,*"[387] while our focus on David Hume seems warranted by Moritz Schlick, the founder of the "Vienna Circle," and the following statement in the concluding chapter of his "*Allgemeine Erkenntnislehre*" of 1925:

"*Basically, the position reached by these considerations is the one already reached by David Hume. When it comes to essentials, I do not believe that it is possible to advance any farther*."[388]

The most momentous attempt to salvage parts of this untenable doctrine was the *linguistic turn* towards the so-called *analytic theory of language* which, however, will not be discussed in the context of the present study. My reasons for this are twofold: firstly, the deficiencies and inconsistencies of the epistemology of *empiricism* are, in my view, too pervasive to be rectified by this "escape" to linguistic philosophy. Books such as Lorenz Krüger's "*Der Begriff des Empirismus*" or, even more drastically, Ernst Tugendhat's "Traditional and Analytical Philosophy: Lectures on the Philosophy of Language" only too clearly demonstrate the hopelessness of any such "rescue attempt." The latter is a collection of twenty-eight lectures, conceived as an introduction to Analytical Philosophy of language. At the end of virtually every chapter, Tugendhat concedes that still no real progress has been made and many open questions still remain but that we should not give up and go on trying to find a way, however tentatively; which he keeps up until the very last line of the book. The last sentence, then, leaves one definitely speechless:

"*The question of what it is to understand a language expression seems, if we do not deceive ourselves, as unclear as ever*."[389]

Well, today, analytic philosophy, as quoted at the beginning of this book and as even its proponents acknowledge, has "*foundered in silence*." As I see it, the problem of their position today is that, on the one hand, they acknowledge that analytic philosophy in its original sense no longer exists and that its essential assumptions could not be validated while, on the other, they assert that in the "pluralistic" diversity of a "methodology

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386 Quoting from: David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975.

387 James Gibson, Locke's Theory of Knowledge and its Historical Relations, Cambridge 2010 (1917); p. 1. Alfred J. Ayer, Editorial Foreword in: D.J. O'Connor, John Locke, Penguin Books, London 1952.

388 Moritz Schlick, Allgemeine Erkenntnislehre, Frankfurt/M. 1979, p. 441.

389 Lorenz Krüger, Der Begriff des Empirismus, Berlin/New York 1979, p. 441; Ernst Tugendhat, Traditional and Analytical Philosophy: Lectures on the Philosophy of Language, Cambridge University Press 1982, p. 410.

movement," essential features such as "rational debate" and the clearness and distinctness of expression have been maintained. What is missing, however, is the open acknowledgement of failure and, even more important, an unsparing analysis of the *causes* of this failure. For there is, of course, a systemic reason why positivism, Wittgenstein's language games, analytic philosophy were unable, in spite of their repeated attempts, to solve their central problems! But while the causes for this predictable failure are already inherent, as I propose to show, in Locke and Hume, they have to the present day not been unequivocally acknowledged and, what is more, have never been rectified.

The second reason is the fact, pointed out by Chomsky, that language in its fundamental structure, its universal grammar, is *innate*. Thus, the medium *par excellence* called on in the attempt to "salvage" empiricism – *language* – has itself become the most prominent and most elaborated example of an *invalidation* of one of the main empiricist dogmas. Furthermore, I share the cumulative objections to linguistic philosophy already advanced by Ernest Gellner in his polemical work "Words and Things." Analytic philosophy has turned out to be a formalistic, boring, conformist and uncreative philosophy of an analysis without perspective. Or, in Gellner's words, linguistic philosophy has failed to realize

"*…that thought is not bound and enslaved by any of the language games it employs, but on the contrary that a most important kind of thinking consists of reassessing our terms, reassessing the norms built into them and reassessing the contrasts associated with them. … One of the things linguistic philosophers fail to notice is that this kind of thinking – which they consider to belong to the pathology of language – is the most characteristic of any kind of intellectual advance.*"[390]

As for those basic features that essentially distinguish empiricism from rationalism, there is the typical emphasis on *sense experience* and the "secondary" role assigned to understanding and reason by the proponents of empiricism. In the 1960s, Wolfgang Stegmüller, one of the protagonists of EAN in the German-language area, wrote:

"*If we were to express the fundamental conviction common to empiricists in a brief formula, it would run something like this: it is impossible to gain information about the real world and its laws through pure thought and without empirical examination by means of observations.*"[391]

Günther Gawlick, having warned that his is a rather rough definition, chooses a similar way of defining *empiricism*:

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[390] Ernest Gellner, Words and Things, Routledge & Kegan Paul Ltd, Abingdon 2005 (1959), p. 78.

[391] Wolfgang Stegmüller, Main Currents in Contemporary German, British, and American Philosophy, Dordrecht-Holland: D. Reidel Publishing Company, 1969, p. 257.

"*One may say that what characterizes empiricism is the thesis that all our knowledge stems from experience. … Without experience, there is no knowledge of reality, all certainty is grounded in sensory certainty; knowledge is built from elements that are immediately given and, thus, unquestionable*."[392]

While these compact definitions already show the above-mentioned attitude clearly, they also raise a number of questions. For I simply can't observe "*the real world and its laws*" (Stegmüller), I can only infer these laws, by thinking, from a plurality of *observations* (*observing* itself being a kind of thinking provided one does not only mean the dead, laterally inversed, upside-down, two-dimensional image on the retina of the eye) and distill them, by persistent reflection, i.e. by *thought*, from what was observed. I can never observe the *validity* of a law, I can "*only*" ever think it. Similar doubts pertain to the concept of *observation* itself, which EAN tends to use quite indiscriminately. We have already seen, with the telling example provided by Norwood Hanson, that the two microbiologists looking into the microscope start out from different background knowledge and different doctrines and, therefore, also "see" different things. Their observations differ accordingly and are never precise enough – not unlike the always somewhat un-round circle – to allow for the direct deduction of a law. Observations are always already "*theory-laden*," they are never "objective," "pure" *real-world* facts. The law, principle, formula, structure must be re-projected, just as the perfect circle, onto them, it is valid "*only*" as a result of thinking.

In his comprehensive and thoroughgoing criticism of empiricism and positivism "*Erfahrung und Struktur*" (1968) – regrettably, if unsurprisingly, not republished – Friedrich Kambartel proposes another definition of *empiricism*, now more in terms of linguistic philosophy. He writes:

"*The concept of a pure experience of data has become, since Locke, one of those theories that can be subsumed under the heading of 'empiricism'. By empiricism, one may understand (in a preliminary definition) the philosophical point of view that considers only those concepts as scientifically admissible that are based on experience or (more vaguely and, thus, even more vaguely phrased) associated with experience*."[393]

This seems to be a very adequate modern definition of empiricism. But let's return to the beginnings of modern empiricism. Key reflections can already be found in Bacon and, in particular, Thomas Hobbes who, in his "*Leviathan*," comments on the thoughts of man (in terms that strike one as almost more modern than the modern empiricists):

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[392] Günter Gawlick (ed.), Empirismus, Geschichte der Philosophie in Text und Darstellung, Stuttgart 2005, p. 10f.

[393] Friedrich Kambartel, Erfahrung und Struktur – Bausteine zu einer Kritik des Empirismus und Formalismus, Frankfurt/Main 1968, p. 19.

"*The Originall of them all, is that which we call SENSE; (For there is no conception in a mans mind, which hath not at first, totally, or by parts, been begotten upon the organs of Sense). The rest are derived from that originall.*"[394]

Symptomatically, the "*original*" here is *sense experience*, in contrast to, for example, Hermann Cohen's Neo-Kantianism, where the "*original*" of thinking is thought. These so-called *sense experiences* are, in turn, supposed to originate from *impressions* we receive of external bodies and objects. This reflection by Hobbes presents the basic idea of empiricism in all its purity: we receive *sensations* from the *external things* which are thus charged with something like an *active role* in the cognitive process (a view that in turn may have been borrowed from the ancient Greek materialists), and these sensations are transmitted to the brain, the *mind*. The structure and functioning of the latter, however, is not given much thought. Since thinking itself cannot be observed by way of *sense experience*, the mind eludes sensory perception and is therefore, from the very start, *external* to the empiricist paradigm. But this does not seem much of a problem as long as one believes to be able to rely on *sense experiences* alone. The incoming sense experiences are, in turn, supposed to directly generate *representations* (we'll pass over the fact that Hobbes locates the generation of representations in the "*organs of sense*," see above, since this may be due to the historical situation), and the representations thus obtained become the "material" from which *all* our knowledge is supposed to be built. For as Hobbes clearly emphasizes: "*For there is no conception in a mans mind, which hath not at first, totally, or by parts, been begotten upon the organs of Sense*." So, every representation is generated by or deduced from the senses. This pronounced sensualism of course gives rise to a number of further critical objections – but I have quoted Hobbes' definition in this context because it very clearly reveals the underlying mindset of empiricism. One gets the impression that the capturing of the rays of light that are reflected by the surface of the things is a much more momentous concern than the organization and correctness of thought processes. So when you solve a hard problem, it is due to great sense-experience, intelligence is unimportant. Calling to mind, once again, Hans-Jürgen Engfers definition of *empiricism*

– "*that all concepts … are based on experience.*
– *that the validity of propositions that are not deducible from other propositions is based on experience and*
– *that all other propositions that are not directly based on experience must be deducible from propositions that are*"

[394] Thomas Hobbes, Leviathan (1640), Penguin Classics 1985, p. 85.

we see that this definition has not changed in any durable way since Thomas Hobbes set forth his fundamental ideas: the basis of all knowledge and, as a consequence, all propositions is "*experience*" (the ambiguity of the terms has been discussed) or, to be more precise, *sense experience*. In the following criticism of the central works of John Locke and David Hume, I have predominantly, and deliberately, relied on Anglo-American commentators. I wanted to avoid being charged with primarily relying on "malicious" continental, if not German, philosophers. Of course, both authors have a rich history of reception also in the German-language area, meticulously reconstructed, for Hume, by Gawlick and Kreimendahl.[395]

## The grounding of modern empiricism: John Locke

In his famous "*Essay concerning Human Understanding*," John Locke sought to integrate the empiricist approaches that already existed in his day into a coherent system. Locke's aim was to demonstrate and describe as well as determine the limits of the mental processes involved in our understanding of the world. It was an approach to grounding the sciences that had already been proposed by Descartes in the first of his *Rules*, where he wonders why most people devote their time to the study and exploration of all sorts of things except "*good sense*," the "*universal wisdom*" which, after all, is the very basis of all those efforts.[396] John Locke's four-volume "*Essay*" is a standard work of philosophy and the first to clearly express and arrange in a "storyline" the basic ideas and the doctrine, still valid today, of *empiricism.* However, interpreting it is a real challenge because writing it took Locke so long – i.e. several decades – and because the ideas set forth in Book III and, in particular, *Book IV* substantially differ from, or even downright contradict, those set forth in Books I and II. The discrepancy is so strong that experts in Locke such as John Yolton sometimes told their students to start with *Book IV* to avoid the confusion likely to arise from a linear reading of the text.[397]

Other authors, in contrast, give the impression that they would rather follow a well-established empiricist tradition, i.e. banish Book IV and confine themselves to the first two or three Books. In my view, the *Essay's* Book IV, which was written much later, is strongly influenced by the Car-

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395 Günter Gawlick/Lothar Kreimendahl, Hume in der deutschen Aufklärung, Stuttgart-Bad Cannstatt 1987.

396 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 9.

397 John W. Yolton, Locke and the Compass of Human Understanding, Cambridge University Press 2010, p. ix.

tesian rationalism that Locke had come into touch with during his stays in France and the Netherlands. In a way, it almost seems as if, as a result of discussions and systematic reflection, the "arch empiricist" Locke had gradually evolved into a moderate *rationalist*, albeit without being willing or able to completely discard the empiricist ideas previously set forth in Book I and II. In Book IV, Locke is quite clearly concerned with concepts such as "*primary ideas*" or "*intuitive evidence*," adheres to the *mathematical method* and sometimes even resorts to the language of Descartes: "*… but as soon as the figure is drawn, the Consequences and Demonstration are plain and clear*" (IV. iv. 9). The problem, then, is to decide which Book and which statements to take as a basis for argumentation, all the more so since Locke's diction tends at times to be rather imprecise and wordy. In some passages, Book IV actually gives the impression of having been directly, if not almost literally, inspired by Descartes' *Regulae*. In his excellent presentation of the Essay, Richard Aaron has highlighted this fact, offering a cross-comparison that also includes the earlier Drafts A, B, and C. It is, of course, true that Descartes' *Regulae* were only published posthumously in 1701, but manuscripts were circulating among his followers, and Locke may well have seen them during his stays:

"*The resemblance between IV. ii. of the Essay and some sections of the* Regulae *is remarkable. For the source of IV. ii, then, it is not necessary to look further than to Descartes's* Regulae*.*"[398]

In any case, Descartes' *Discours* was published in 1637, an English translation with a preface of Cambridge Platonist Henry More appeared in 1649, while Locke's Essay in 1690, so that Locke could comfortably draw on Descartes' methodology, discoveries and brainchildren.[399] As for clarity, due to the way his Essay was written, Locke's approach, too, is not exactly helpful. D.J. O'Connor comments:

"*But his careless use of technical terms is a source of great confusion. And the manner in which the Essay Concerning Human Understanding was written ('by incoherent parcel; and after long intervals of neglect, resumed again, as my humour or occasion permitted') makes it a poorly constructed, ill-balanced and repetitious work.*"[400]

One cannot but agree with O'Connor in this respect, and of course such an inconsistent work was not an ideal construction plan for assembling the ground beams of the ship of *empiricism*. Indeed, one could say that except for those important innovations that Locke learned from Descartes, such as *ideas*, *thinking substance* and *intuitive evidence*, etc., there are pri-

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398 Richard. I. Aaron, John Locke, Clarendon Press Oxford 1955, p. 220, 221.

399 Peter Schouls, The Imposition of Method, Clarendon Press, Oxford, 1980, p. 4, fn. 4.

400 D.J. O'Connor, John Locke, Penguin Books, London 1952, p. 14.

marily three fields that are properly and genuinely empiricist: 1. the categorical rejection of *innate* ideas and principles, 2. the *sensualistic* theory of perception, or epistemology, and 3. the book on *language*; that is, those three fields that, from a scientific perspective, have been revealed as erroneous.

Book I is entirely devoted to an attack on, as Locke calls them, "*innate principles and ideas*." Locke holds that there are no innate ideas, concepts or general principles, and by disposing of the radical defenders of this thesis he basically seeks to clear the way for his own philosophy. However, Locke's whole argumentation in Book I, his sweeping attack on innate ideas and principles (his arguments will be discussed in detail in the chapter on innate ideas and Peter Carruthers) is such a far cry from Descartes's view, while its reasoning is at times so contrived, that generations of commentators have struggled to find out exactly who was the target of this attack – Herbert of Cherbury, or the Cambridge Platonists, or perhaps, why not, Descartes and the Cartesians? At any rate, the way Locke presents his arguments makes one wonder whether he wasn't creating a cardboard character he could, then, easily defeat in his "war" without really engaging in an in-depth examination of the structure of the "enemy's" arguments. Alfred Klemmt even felt that regarding the actual ideas set forth by Descartes and nativism, Locke's arguments and general treatment of the issue was so beside the point that he chose not to bother with Book I at all in his analysis but directly started with Book II.[401] And A.C. Fraser wondered whether Locke was perhaps not well-read enough in philosophy to be able to properly and adequately deal with the issue of innate knowledge, in the first place:

"*Locke was perhaps too little read in the literature of philosophy to do full justice to those who, from Plato onwards, have recognized, with increasing distinctness the presuppositions of reason, and the activity of the often latent faculties of intellect and moral judgment, …*"[402]

At any rate, after his attack on innate principles and ideas in Book I, Book II is where Locke starts to methodologically set forth his doctrine of empiricism. I will in the following focus on the problem fields identified at the beginning of this chapter, i.e. the theory of perception and the "*theory of ideas*." The key issue in this context is the origin of the so-called "*simple ideas*" and Locke's postulation that they – and only they – come *directly* from the real things and immediately stream into the empty mind where their imprint is *passively* registered. This problem field will thus be discussed in due detail, for if the forming of *simple ideas* by direct reception from the things as suggested by Locke cannot happen that way, then

401 Alfred Klemmt, John Locke, Meisenheim/Glan 1952, p. 21.
402 Alexander Campbell Fraser, Locke, Edinburgh 1890 (reprint 2012) p. 117.

the forming of *complex ideas* by assembling them is also compromised, which in turn would result in the breakdown of the entire "food chain" from sense experience to concept at the very first link.

But before going into this, one more remark concerning the empirical-observational method that Locke and, later, Hume claim to rely on for building their systems. Actually, what we exclusively find is empirical *first-person observation* in what might be called a naïve "one-man observational study," and never any real experiments. *Thomas Hill Green*, one of the most sharp-witted 19th-century English philosophers who did a meticulous philosophical "dismantling" of Locke and Hume in his virtually hushed up introduction to Hume's "Treatise of Human Nature (like most of the works that are critical of empiricism, his works, too, are hardly to be found anymore – my quote here is from the "Forgotten Books" edition), highlights the fact that this is a *one-man-experiment*, and criticizes its presumptuous air of scientificity:

"*There are two propositions on which Locke is constantly insisting: one, that the object of his investigation is his own mind; the other, that his attitude towards this object is that of mere observation. He speaks of his own* mind, *it is to be noticed, just as he might of his own body…. As an observation of the 'thinking thing', the 'philosophy of mind' seems to assume the character of a natural science, and thus at once acquires definiteness, and if not certainty, at least plausibility.*"[403]

And of course the English philosopher, trained in Kant and Hegel, asks the questions that would at once come to the mind of any German or Austrian student who has gone through his share of German idealism: what can "*observing*" *the operations and processes of the mind* mean? Do those parts of one's consciousness that one can perceive and be aware of, that is, certain representations and thoughts Locke has as an individual, describe the totality of mental operations or are they just the "peak of the iceberg," passed off as the whole thing, of what can be internally perceived? *Who* or *what* in or about the mind is the observer, and *who* or *what* is observed? And who or what is the "referee," or the criterion, that determines whether one's findings really correspond to what one was actually thinking? In this context, Green at once raises an essential objection: if *observation is the basis of the empiricist method – who, then, has ever observed the purported "tabula rasa,"* this alleged original state of a mind still devoid of any impressions? A question never asked by the thinkers of EAN, who take the method of *self-observation* at face value.

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403 Thomas Hill Green, Introduction to Hume's Treatise of Human Nature, Works Vol. 1, Forgotten Books, London 2015 (1918), p. 6.

This deficient method of course results in many logical inconsistencies, as I propose to show by once more using the rough example of the operating system and the data in a computer. Let's, for the moment, ignore that the "data" in our perception will always already have been actively selected and structured in the very process of being perceived, and focus on the situation of the data in relation to the operating system. What I see on the monitor, e.g. a projection of color points which simulate a picture of Paris for me, are data points, pixels. But for a picture of "Paris" to form at all, these color points need to be prepared, organized, composed, mixed, superimposed, contrasted etc., all of which is done by the operating system and the imaging software, etc. This is the real *function*, the complex "cognitive" performance that generates the picture. If I rely on an copy-like observation alone, I have to go by the picture on the monitor and will talk about the picture of "Paris" that I see. But what I cannot *perceive* is the totality of the computer's background workings, the totality of the workings of the system. Does this mean that the entire imaging software that works in the background does not exist, that it is "metaphysical," phantasmal, idealistic, because it cannot be directly observed? Or does it mean, rather, that I am being reductive and superficial because I confine myself to the visible picture of Paris, the make-believe? The latter situation, however, is the one we are placed in by the empiricist method of self-observation, for it results in a methodical *self-deception* and ignores the highly complex self-reflective mode of thinking.

Locke starts with subscribing to Descartes's mode of *representation*, that is, the insight that we can grasp the world only in terms of "ideas," for in contrast to what materialists and naturalists would make us believe, the brain in its bony shell and, thus, the mind can never *directly* touch or handle the things. For Locke, this means that the things are represented by ideas in the mind but that we can never ultimately know them in themselves and in their substance. Copy-like *ideas*, for him, are *all the contents* that are present in the mind – what today we would probably call representations – but sometimes he also speaks of *images*. This raises a specific problem, namely, that the *ideas* formed on the basis of what we perceive are not terminologically distinguished from the ideas that denote functions, relations, etc. Alfred Klemmt justly notes in this context that the result is a blurring of the qualitative difference between ideas that are received, that is, *ideas* in terms of *sensory impressions*, on the one hand, and *ideas that are formed*, through thinking, in terms of an insight into connections and relations (also described as ideas by Locke), on the other. Concretely *how* this thinking by ideas is supposed to happen, however, remains very vague in Locke. For he writes:

"*…; having* Ideas*, and Perception [is] the same thing*" but also: "*We know certainly by Experience, that we sometimes think, and thence draw this infallible Consequence,*

*That there is something in us, that has a Power to think: But whether that Substance perpetually thinks, or no, we can be no farther assured, than Experience informs us.*"[404]

Incidentally, it should be noted that Locke, just as Descartes, assumes a *thinking substance*. Also, Locke frequently confounds *idea* in terms of the *act of thinking* and idea in terms of the *content of thinking*, but this is one of his minor errors.[405] And his conception of the simple ideas that are thus perceived varies between individual sensory impressions and, elsewhere, an "*image or 'picture' in the mind*."[406] Images or eidetic thinking, in turn, is a highly controversial issue in EAN since *language* alone is supposed to be capable of expressing thoughts, and to do so by means of propositions. There have been decades of heated debate about whether eidetic thinking is possible at all or whether thinking is just "silent inner speaking."[407] But even without going any further into the issue it is already obvious that Locke's diffuse concept of idea and his vagueness concerning the reflective nature of *thinking*, which in his writings degenerates into something like a module for assembling *simple ideas*, makes the ship of *empiricism* list from the very start.

Locke then goes on to distinguish between *simple ideas*, that is, those that directly stream in from the things and imprint themselves on the mind, and *complex ideas* that the mind either assembles, in the manner of a "modular system," from *simple ideas* or habitually grasps as such, or so he asserts, because they are often found in association with each other (for example as a thing). Officially, however, Locke's doctrine holds *that all complex ideas are assembled by the mind from simple ideas*, even though he sometimes argues as if *complex ideas* could also be perceived as a whole, which would require the reverse process of disassembling and analyzing the elements they were built from.[408] At any rate, in Book II, Locke quite clearly states:

"*Though the Qualities that affect our Senses, are, in the things themselves, so united and blended, that there is no separation, no distance between them; yet 'tis plain, the* Ideas *they produce in the Mind, enter by the Senses simple and unmixed.*"[409]

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404 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II. i. 9 and 10, p. 57f.

405 Alfred Klemmt, John Locke, Meisenheim/Glan 1952, p. 50.

406 John J. Jenkins, Understanding Locke, Edinburgh University Press, Edinburgh 1983, p. 20.

407 See Stephen M. Kosslyn, The Case for Mental Imagery, Oxford University Press, Oxford 2006; and Zenon Pylyshyn, Seeing and Visualizing, Bradford MIT Press, Cambridge/London, 2006.

408 John J. Jenkins, Understanding Locke, Edinburgh University Press, Edinburgh 1983, p. 32f.

409 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II. ii. 1, p. 64.

Here, Locke's view is after all clearly expressed: the sensory components that are transformed into ideas are supposed to be *fixed* (!) qualities and structures that are completely and without remainder contained in the *real thing* and yet present themselves as simple building blocks of knowledge, magically disassembled, meaningfully "pre-portioned," and qualitatively defined, when they come streaming in by the sense organs. And since the things are supposed to actively supply pre-portioned ideas that are *particular* and *unalloyed* and, what is more, *such as they are objectively in the things*, these contents of thinking are pre-defined in a way that creates the illusion that it is not thinking at all which, relying on category-guided laws of thought, laws of gestalt, processes of enhancing awareness, and synthesis of what is perceived, liberates and reconstructs the things from their "compoundedness" and manifoldness. In the empiricist conception, our perception happens in a seemingly *direct* way, as a seemingly *objective reproduction*, just as we see the picture of Paris on the monitor without giving thought to all the processes that were needed to generate it. This point, that is, the surreptitious obtaining of a *direct reproduction* of the things from seemingly pre-portioned and pre-structured "*ideas*" can hardly be overemphasized, for it marks the *foundational error of empiricism* from which almost all its subsequent wrong tracks can be inferred! In addition, there are those *complex ideas* that result from reflection, that is, the ideas that the mind has to somehow concoct from the simple ideas received, the *modes*, *substances* and *relations* that can never stem from perception in any direct way. All in all, however, it is the unclear nature of the concept of idea that is already a source of confusion:

"*Every Man being conscious to himself, That he thinks, and that which his Mind is employ'd about whilst thinking, being the* Ideas, *that are there, 'tis past doubt, that Men have in their Minds several* Ideas, *such as those expressed by the words,* Whiteness, Hardness, Sweetness, Thinking, Motion, Man, Elephant, Army, Drunkenness, *and others: …* (my emphases, WW)"[410]

So *ideas* form the contents of our thinking and can be expressed by names. But then Locke specifies a number of concepts that differ in their logic and cannot be simply lumped together. Thus, "hardness" is a simple, general concept while "thinking" is a mental activity that cannot be directly observed. "*Army*," in turn, would have to be built from a highly complex combination of *simple ideas*, but these, as discussed above, can never contain the *unobservable* components and functions of an *institution*. At any rate, it is important to note at this point that the understanding of "*idea*" is fundamentally different from the concept once set forth by Plato. For Plato, the perfect circle in itself is the *idea* of the circle, that is, the *law*

[410] John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II. i. 1, p. 54.

(Natorp) that will tell us, at any time and in whatever world, how to think a circle, what a circle has to look like ideally, what is not a circle, etc., while for Locke idea is any thought that is present in thinking but must basically stem from particular *sense experiences*. But how do we receive these ideas at all? Here, Locke offers a very explicit example that is virtually the *key dogma of empiricism*:

"*Let us then suppose the Mind to be, as we say, white Paper, void of all Characters, without any* Ideas*; How comes it to be furnished? Whence comes it by that vast store, which the busy and boundless Fancy of Man has painted on it, with an almost endless variety? Whence has it all the materials of Reason and Knowledge? To this I answer, in one word, From* Experience*: In that, all our Knowledge is founded; and from that it ultimately derives it self. Our Observation employ'd either about* external, sensible Objects*;* or about the internal Operations of our minds, perceived and reflected on by our selves, is that, which supplies our Understandings with all the materials of thinking*. These two are the Fountains of Knowledge, from whence all the Ideas we have, or can naturally have, do spring*."[411] (my emphases, WW)

This is the famous exposition of the "*tabula rasa*," the empty plate or "*blank slate*", the view that at birth, the human mind is like an empty paper with nothing written on it and only gradually and with time begins to be inhabited by various contents ("*all the materials of Reason and Knowledge*"). At any rate, it should be noted that Locke speaks of *two sources*, that is, of the ideas that come either from "external objects" (although, strictly speaking, what comes from the outside is physical sensations – waves or particles – rather than ideas) or from "the internal operations of our mind." It should be emphasized that even that there are *two sources*, for empiricist and EAN literature tends to primarily focus on the reception of external sensations and impressions, of experience, sensory perception, sense experience etc. But Locke quite clearly refers to the observation of the *operations of the mind* as a second source. Of course, this second source, i.e. the *operations of the mind*, is "downstream," and all they can do is *passively* receive and retrospectively assemble, as it were, the ready-made *building blocks* (Nicholas Jolley at some point calls them *bricks*) that are supplied from the outside; which tacitly implies that what we form as ideas is at the same time always already structured and served, bite-sized, by reality, just as ready-made bricks are. This, of course, is profoundly inadequate, but not important at this point. Hume will later eliminate even these last remnants of insight conceived of as an act of *thinking and constructing*, these "operations of the mind" in the buildup of thought, and replace it by "association."

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411 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II. i. 2, p. 54.

Now this raises a crucial issue, for on the one hand, Locke states that the mind itself is a *tabula rasa*, i.e. an empty plate without content and, thus, *also without structure* – just *empty*, while on the other, the *operations of the mind* are needed for it to be able to assemble the myriads of sense experiences which Locke's *simple ideas*. But the way he conceives of – and rather vaguely describes – the relevant process rather suggests that the transformation of the *simple ideas* that are received through perception does not happen immediately, "online," but actually more "downstream." If one assumes that *universal ideas* such as "equal" cannot be plucked from the world in any fixed form but need to be grasped, with an effort, by the mind; and if this mind is, at the same time, supposed to be initially an empty plate without *content* or *structure*, just *completely empty*; then "booting" such a system – to return to the comparison with a computer – is fundamentally impossible because the *operations of the mind*, that is, the module that is supposed to assemble the incoming sense experiences, can have no structure at all at this point! And since everything is empty and unstructured, it would first to give itself a structure from the incoming sense experiences, a task for which, however, there is no construction plan, no structure and no instruction on the empty plate. Hardly thinkable!

Now, Locke further assumes that the mind is able to directly transform the *simple ideas* which we must passively receive from the world of things and which, being concrete, are always different, fluctuating, isolated, into *general ideas*, and presupposes that these *simple ideas*, these building blocks or bricks, are already "ideally configured," that is, represent the "perfect example" of, for instance, "red" or "round." But an "example" is already much more than a simple, direct sense experience, for it implies comparison, delimitation, differentiation, generalization, definition – things an empty plate is quite incapable of doing. Alfred Klemmt notes that Leibniz had already pointed out this fundamental misconception:

"*One can say, I believe, that these sensory ideas appear to be simple because due to their indistinct nature they do not offer the mind a means to distinguish their individual content features … It is, for example, obvious that green results from a mixture of blue and yellow, so one may also believe that the idea of green is composed of these two ideas. And yet the idea of green appears to us just as simple as the idea of blue or warm; which justifies the assumption that the ideas of blue or warm, too, only appear to be simple*."[412]

[412] Alfred Klemmt, John Locke, Meisenheim/Glan 1952, p. 77. This example is also used by Leibniz in: Gottfried Wilhelm Leibniz, Betrachtungen über die Erkenntnis, die Wahrheit und die Ideen, Fünf Schriften zur Logik und Metaphysik, Stuttgart 1982, p. 16f.

A perhaps even better example for demonstrating that the dreamed-up *pure simplicity* of the *simple ideas* can only be a chimera is offered by Barry Stroud with respect to Hume's doctrine, adopted from Locke, of *simple* and *complex ideas*:

"*Using the vague criterion of simplicity suggested by what Hume says, it would seem that the idea of this particular red is itself complex, since it has a particular hue and a specific intensity, both of which can be distinguished from each other. Similarly, a particular note sounded on a piano would seem to give us a complex impression, since its pitch is something different from its timbre.*"[413]

And one might even extend this example of the note sounded on a piano to the position of this "simple" note within a musical scale, or a famous piece of music that starts with it, or an expert who hears the absolutely correct note although the piano is untuned, etc. So, there is the justified objection that what is propagated as a mere, *pure*, *simple* building block, as a *simple atom* of the perception, is actually not so *simple* and *pure* at all but always *compounded*, "*impure*," and presents itself always differently in multiple relations and from various points of view, as in the case, for example, of color hues. And of course, this gives rise to further questions concerning the delimitation, the degree, the transitions, all of which the empty plate (tabula rasa) that lacks prior knowledge and a preexisting structure could never receive from the environment in any simple and uniform way. Klemmt quotes his teacher Alois Riehl in this context, a neo-Kantian with a leaning towards empiricism:

"*Simple sensory ideas do not exist in our immediate experience; searching for them is a task for research, and they can only be inferred through a combination of perception and experiment, a theoretical approach*."[414]

So even thinkers who lean toward empiricism more or less agree that *simple ideas* as suggested by Locke and Hume cannot exist per se and cannot be perceived by the consciousness in this form. It is important to be quite clear about this at this point, for it shows, firstly, that Locke's naïve method of self-observation led to wrong conclusions and, secondly, that the very first steps of the empiricist theory of perception have proved to be impracticable. For empiricism, which after all seeks to exclusively rely on "*sense experience*" as a basic criterion, this is quite a bad start.

Now, according to Locke, *complex ideas* are "built" from *simple ideas* and, inversely, must be capable of being disassembled, without remainder, and stacked by the mind like in any modular system. But this leads to an important conclusion: if the basic building blocks of the Lockean system, the *simple ideas*, cannot be individually isolated in and extracted from the

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413 Barry Stroud, Hume, Routledge London/New York 1990, p. 20f.

414 Alfred Klemmt, John Locke, Meisenheim/Glan 1952, p. 79.

field of view in the way conceived by him, then the *assemblage of complex ideas* is also impossible, and the whole process of the empiricist generation of objects and ideas from sense experience is simply impracticable. The *universal* cannot be "read off" from the field of view in the form of buildings blocks, bricks or perceptual atoms. Incidentally, a rather peculiar detail has become a permanent feature of EAN thought in this context: the assumed existence, already postulated by John Locke – following the doctrine of Robert Boyle of whom he thought very highly – of *corpuscles*, that is, minute particles that are supposed to be emitted by the things and to passively imprint themselves on us.[415] So, *experience*, *observation*, *sense experience* etc. are permanently invoked, on the one hand, with an atomistic theory of perception being built on them, while, on the other, it is impossible to *directly* see these minute building blocks, these atoms, which in turn are built from yet other elements (electrons, protons, quarks, etc.) that *cannot be directly observed* either, only described by the mind through mathematical of physical equations and theories. And, ironically, these invisible particles that are supposed to be the basis – postulated with utter conviction – of "matter" ("*bits of matter*"[416]) are the very reason why currently all theories unravel, and the question now is: "What remains of particle physics?"[417] Which goes to prove, once again, that "physics" is thought and generated rather than simply copied by *sense-experience*; the perfect example being our theory of atoms and subatomic particles, which keeps changing almost on a yearly basis.

Moreover, *empiricism* at the same time makes itself an eternal slave to *perception*, for even Locke realizes that the microscope affords a different view of the world than the naked eye does, but then reassures himself by saying that *God*(!) has, after all, chosen to endow us with those visual capacities that we need in the practice of our lives.[418] But while Descartes' philosophy has always come under massive attack by EAN at this point because of his reference to God, the canons keep silent whenever Locke invokes God – they call this "*charitable reading*" in EAN. This all places EAN philosophy in a truly grotesque situation: *they cannot observe the last building blocks of the matter from which they claim to directly read off all knowledge, nor can they observe thinking, the essence of reasoning!* So, as a last solution, there is nothing else for them but to express *thoughts* by language games to which they attribute something like extraterrestrial

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415 Nicholas Jolley, Locke – his philosophical thought, Oxford University Press 1999, p. 64f.

416 Jaegwon Kim, Philosophy of Mind, Westview Press, Boulder, Colo. 1996, p. 11.

417 Michael Esfeld (ed.), Philosophie der Physik, Frankfurt/Main 2013, esp. p. 118, 150, 158.

418 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II. xxiii. 11 and 12, p. 184ff.

objectivity. This double dilemma is the real reason behind the "linguistic turn," the turn to language. It is not an ingenious strategy but the last resort of a basically erroneous philosophy that failed to find support for its approach of "*sense experience*" in either the external world or the consciousness. Of course, language is overtaxed by this, and expected to deliver what is beyond its scope.[419] And on top of everything, there is Chomsky showing that *language* itself is the prime example of *innate knowledge* – bust at all levels!

But let's get back to the deficiencies of the doctrine of *simple ideas*. These *simple ideas* that are supposed to be the basis of *sense experience* as conceived of by empiricism are characterized by the following properties: 1. they must come from "material" from the outside, that is, the mind cannot have created them, 2. they cannot be further broken down for, if they were more complex, they would be *complex ideas* which in turn, according to Locke, *cannot* be *directly* received, and 3. they must be objectively valid. But how are we to conceive of this way of receiving ideas in reality? To illustrate the process, J.D. Mabbot uses our perception of an orange.[420] Looking at it in a naïve empiricist way, one could say that the dark and empty cabinet of the "mind" is being passively filled with the color "*orange*," the form "*round*" or partly "*oblong,*" and so on, until the orange has been recognized by our mind. But things are not that simple: the color may vary, the rind may be more or less dimpled, the surface may show irregularities, small pores, large pores, etc. In short, and even in the case of an orange, what the mind is said to passively receive as something *simple* and *uniform* are not forms, colors and qualities that are pure, simple and predefined but thousands of different forms, colors and structures. And since for Locke, the mind is an *empty white paper* or a *dark cabinet* (are these so very similar?) it would drown in an ocean of *simple ideas* even with a thing as simple as an orange rather than be able to organize these millions of forms and colors and their wide range of different manifestations in a structured way and as something *universal*. Nor can it attach *names* to these details as details, for even a single orange has more pores, bends, color hues etc. on its surface than there are names the mind could invent. So, it is impossible for a *universal form* to emerge from the immediate perception of an infinite number of details, a fatal fact highlighted by O'Connor as follows:

"*But even simple sense data such as these, as they occur in every-day experience, rarely present one uniform character indistinguishable into parts which differ sensibly one from another, be it ever so slightly. And even if we take a coloured patch in which no*

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419 All there is to say to this has been said by Ernest Gellner, whereupon he was denied a professorship; see the comment by Bertrand Russell in his Introduction to Ernest Gellner, Words and Things, Routledge London/New York 2005 (1959).

420 J.D. Mabbott, John Locke, The Macmillan Press, London 1973, p. 18.

*part is sensibly different in hue from any other part, such a sense datum is clearly not 'uncompounded' in an unqualified sense. It is, for example, made up of smaller patches i.e. it is spatially compounded. Moreover, in order to be sensed at all, it must be temporally extended for a small, but measurable minimum period. Would those conditions disqualify sense data from being 'simple ideas' in Locke's sense? If so, this would mean that the only simple ideas, in a strict sense, would be, for example, the smallest uniform colour patch which is visible and others of this kind. But it is fairly certain that Locke never considered this question*."[421]

This means two things: firstly, it is impossible for the blank, empty, unstructured mind to initially form itself from an infinite universe of individual impressions and to become what Locke and EAN structurally expect it to become; which, secondly, implies a much more momentous problem: for as we have seen, *empiricism* assumes that the *simple ideas*, that is, the myriads of incoming individual perceptions and impressions can be "switched through," as it were, as proportioned, fixed ideas that only need to be given an adequate *name*. So – and this is the very point of the eternal *self-deception* – there actually are two components to the empiricist concept of *simple idea*: an external one that is sensualist and particular, and an internal one that is *tacitly assigned*, general and universal. These are confounded, as circumstances require. Thus, I see an individual red patch that I grasp as "red," and I see that this patch is round, so it internally becomes a "ball." I then assemble these two into a "red ball." But the unselected, passive inflow of impressions – the rhapsodic chaos of impressions – cannot, as required by this model, lead to the formation of structures and organized forms, which means that the grasping of *simple ideas* and their subsequent assemblage into a thing cannot happen at this level since they are always particular. Concepts such as "equal" or "round," however, are always *universal*, just as the sensory impressions are always particular. Can this contradiction be resolved at the level of *vision*? That's unlikely. But then it can only be resolved in thinking, and this is precisely what Hegel sought to make clear in his "Phenomenology of Spirit" in the chapter on "Sense-Certainty" ("Die sinnliche Gewissheit"). For not only is there no way for structure to emerge from individual perceptions, there also is no way for "round" to be received from sensory perception, since this is an "*universal idea*," or universal. For "round" obviously refers to any ball and, as Hegel had already shown, the *function* of a ball is always already contained and expressed in the *concept* of a ball, in any "this" individual ball: being *a ball*, it is always already *round*. And this is where empiricist logic – at least as developed by Locke – obviously breaks down. Mabbott very concisely comments:

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421 D.J. O'Connor, John Locke, Penguin Books, London 1952, p. 47.

"*But what is the colour we see when we look at an orange? Not a uniform shade, both because of the irregularities of the surface and because of shadow on one side. Locke might reply that all the colours we see are shades of orange and he has said that the shades of a colour are modes of the colour itself, which is a simple idea. But then the simple idea would be an abstract general idea (as the list whiteness, hardness, sweetness suggests). But this would involve Locke in contradictions, because simple ideas are given and cannot issue from mental activity and general ideas are the work of human mind.*"[422]

But then we are right away confronted with another abysmal problem regarding the *simple ideas*, for since they are particulars, they not only cannot be directly isolated as *universals* from the field of view, they can also not be captured conceptually because this systematic capturing and denoting would always presuppose a process of abstraction that cannot yet exist at this "simple" level. The *direct* capturing of simple *ideas* – not *sense experiences*! – that is literally postulated by Locke is impossible even according to his own theory. But since the direct "switching through" of *simple idea* to name, since the "*seeing*" of *red*, *square*, etc. is essential for the empiricist mode of perception Locke keeps alternating between positions. This is not negligence or a "*careless use of technical language*," as the "Locke followers" sometimes offers as an excuse. Rather, this is where his philosophy fundamentally breaks down, for due to the logical inconsistencies at more than one level there is no way – as explained above – for a relation to be established between the raw, always particular, unformed sense experiences that we are supposed to passively receive and the *universal function* of the concept. Wilfried Sellars was one of the few philosophers of Anglo-American mainstream philosophy to have critically described and discussed these gross inconsistencies in Locke's and Hume's empiricism. In "Empiricism and the Philosophy of Mind" he writes:

"*Thus an examination of Locke's* Essay *makes it clear that he is thinking of a sensation of white as the sort of thing that can become an abstract idea (occurrent) of White – a thought of White 'in the Understanding' – merely by virtue of being separated from the context of other sensations (and images) which accompany it on a particular occasion. In other words, for Locke an abstract (occurrent) idea of Whiteness is nothing more than an isolated* image of white, *which, in turn, differs from a* sensation of white *only (to use a modern turn of phrase) by being 'centrally aroused.'*"[423]

Also, Locke quite clearly states: "The Senses at first let in particular *Ideas*, and furnish the yet empty Cabinet" (I. ii. 15). So is it raw sense experiences or *particular* ideas that are let in – or is it fixed *simple ideas* that we passively receive in a pre-structured form – in other words, are the ideas

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422 J.D. Mabbott, John Locke, The Macmillan Press, London 1973, p. 52.

423 Wilfried Sellars, Empiricism and the Philosophy of Mind, Harvard University Press 1997, p. 59.

(red, round, big) already there, fully prepared and *universal*, in the "outside world" even before they are received by the mind and, then, transformed so they are at all capable of "*furnishing the yet empty cabinet*" of this mind? Intuitively and from a purely physiological perspective one would assume that man has a *field of vision* (or a *manifold* as Kant would call it) that has evolutionarily developed as a result of light conditions, adaptation, needs, etc.. The eye receives an ever-changing inflow of photons and light waves which are structured and processed, in accordance with the laws of gestalt, in the very act of being perceived. But these are not *fixed* and passively received *ideas* but actively processed perceptions that are, in the best of cases, transformed into *gestalts*, figures and objects before there is any understanding at all of their function at this level. In contrast, what is less easy to imagine is an inflow of *particular*, *readily formatted ideas that already come with a meaning and a function*. J. Jenkins further confirms this:

"*Essentially, these ideas, though simultaneously received, are single and separate: they just happen to accompany each other on entry into the mind. The suggestion seems to be that, while in practice, I may see a red, square, metal box as complex perception; I could have had the simple ideas of redness, squareness, being metallic, and so on as separate experiences. … In the first place, is it possible, for example, to receive from sensation an idea of redness in itself as opposed to receiving the idea of a red something? Again, is it possible to receive from sensation an idea of square something? Secondly, even if it is possible to receive these ideas singly or separately, would they all be simple in the same sense? Squareness, and the property of being metallic, for example, do not seem to be simple in the way in which redness is simple. For one thing, we can define these former properties in a way in which we cannot define redness. Yet Locke's account seems to imply that they too are directly received in sensation.*"[424]

Now the majority of commentators, perhaps due to their empiricist background, do not seem inclined to use the full measure of critical acuteness when dealing with their empiricist forefathers. Thus Jenkins seems to accept, in the above example, that *redness* is posited as an idea and supposed to be received as such. But apart from the difficulties, already pointed out by Leibniz, of precisely determining color hues as *simple ideas*, redness is a *universal* concept. But due to the tenet that concepts depend on sense experience alone, the essential part of the *understanding-based process of determining these universal concepts* is constantly ignored in empiricism, thus enabling them to believe that the task merely consists in the direct naming of "bricks" of perception. In his grandiose work "Platos Ideenlehre," *Paul Natorp*, in a commentary to Plato's "*Theaetetus*," explains the radically different approach to the perception of color pro-

[424] John J. Jenkins, Understanding Locke, Edinburgh University Press, Edinburgh 1983, p. 26.

posed by a *rationalism* that refuses to make itself a slave to sense experience:

"*Two different colors, for example, need to be perceived each by one sense organ; in contrast, the statement, pertaining to both of them, that they both exist, that each is different from the other but identical to itself, that together they are two but each of them is one, that they are equal or unequal in quality, these determinations that apply to all of them and on the strength of which we state that something is or is not this or that – then, in a substantival mode: being and nonbeing, as well as identity and diversity, qualitative sameness and non-sameness, unit and number, pair and impair … which organ is supposed to let us grasp all this? The answer: rather than a specific organ, it is consciousness itself that grasps these 'universal' determinations by its own workings and not by any corporeal organs.*"[425]

This basic fact that the material of *sense experience* is neither the carrier of *meaning* nor of *function* of the concept, has simply not been reflected in empiricism. Helmut Holzhey comments:

"*Locke's formulations on introducing a specific sensory cognition suggest a certain unease. Likewise, one cannot but note that sensation is now no longer conceived of as just the source of the material of cognition but also the means of cognition. (…) Knowledge of the existence of natural objects is gained through sensation, i.e. experience. Sensation, or experience, itself is cognition.*"[426]

Sensations, initially merely the "material of cognition," have *tacitly* become cognition itself which, in turn, is now called *experience*! Thus, "*experience*" is obtained by subreption, i.e. not by the continual and reflective workings of the mind and the effort of concept building but by a direct "switching through" from *sensation* to *name*.

The whole absurdity of Locke's conception of sense experiences, simple ideas, complex ideas, perceptions, tabula rasa, etc. has been summarized, vivisection-like, by Thomas Hill Green in his signature sarcastic style:

"*Looking merely to it, we should probably say that by sensation Locke meant 'an impression or motion in some part of the body;' by the idea of sensation 'a perception in the understanding,' which this impression produces. The account of perception itself gives a different result. 'Whatever impressions are made on the outward parts, if they are not taken notice of within, there is no perception. … Here sensation is identified at once with the idea and with perception, as opposed to the impression on bodily organs. To confound the confusion still farther, in a passage immediately preceding the above, 'Perception,' here identified with the idea of sensation, has been distinguished from it, as 'exercised about it.' 'Perception, as it is the first faculty of the mind exercised about our ideas, so it is the first and simplest idea we have from reflection.' Taking Locke at*

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425 Paul Natorp, Platos Ideenlehre, Eine Einführung in den Idealismus, Hamburg 2004 (1903), p. 112.

426 Helmut Holzhey, Kants Erfahrungsbegriff, Basel 1970, p. 76f.

*his word, then, we find the beginning of intelligence to consist in having an idea of sensation. The idea, however, we perceive, and to perceive is to have an idea; i.e. to have an idea of an idea of sensation. But of perception again we have a simple or primitive idea.* And then Thomas Hill Green, taking Locke at his word, reaches the superbly absurd conclusion: *Therefore, the beginning of intelligence consists in having an idea of an idea of an idea of sensation.*"[427]

But the model proposed by Locke implies yet another *problem* that fails to be addressed in most of the comments by analytic philosophers, namely the observation of the *operations of the mind* by – whom? The mind, it would seem. But haven't we learned that the mind, in the beginning, is an *empty plate*, that it is *completely empty*? Which raises the problem that the mind that is tasked to take in sense experiences and assemble them into *complex ideas* needs at the same time to observe itself executing these operations of which, however, we do not know how the mind, being blank, is supposed be able to execute them when all it can rely on is the empty plate with no structure nor content. Thomas Hill Green speaks of "*unperceived perception*" in this context. One suddenly realizes that the "veil of ideas," the castles in the air are not brought into the world by rationalism or idealism – that actually, once its doctrine is taken at its word, it is empiricism itself that creates them. It survives all these inconsistencies by its non-stop talking of "*experience*" and "*observation*" and the regular reference to possible repairs some time in the future. Yet it's not that hard to see that such an unstructured system can never form on the basis of random isolated impressions from outside, that it is impossible for a structured consciousness to emerge without a pre-existing, preformed, innate, evolutionarily matured structure. Now, as for Locke, one might still assume some negligence, or the one-time use of an ill-advised image on his part, but he gets even more explicit:

"*If it shall be demanded then,* When a Man begins to have any Ideas? *I think, the true Answer is, When he first has any* Sensation. *For since there appear not to be any* Ideas *in the Mind, before the Senses have conveyed any in, I conceive that* Ideas *in the Understanding, are coeval with* Sensations*; which is such an Impression or Motion, made in some part of the Body, as produces some Perception in the Understanding. 'tis about these Impressions made on our Senses by outward Objects, that the Mind seems first to employ it self in such Operations as we call* Perception, Remembering, Consideration, Reasoning, *etc.*"[428]

In other words, the idea is something like a *direct* mental reproduction, or transformation, in the mind of the sensation, that is, of the impression

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427 Thomas Hill Green, Introduction to Hume's Treatise of Human Nature, Works Vol. 1, Forgotten Books, London 2015 (1918), p. 9.

428 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II. i. 23, p. 63f.

received from "without": "*…, having Ideas, and Perception being the same thing.*"[429] Locke further informs us that

"*In this Part, the* Understanding *is merely* passive; … *For the Objects of our Senses, do, many of them, obtrude their particular* Ideas *upon our minds, whether we will or no: …*"[430]

And, in a later passage,

"*…, That external and internal Sensation, are the only passages that I can find, of Knowledge, to the Understanding. These alone, as far as I can discover, are the Windows by which light is let into this* dark Room*. For, methinks, the* Understanding *is not much unlike a Closet wholly shut from light, with only some little openings left, to let in external visible Resemblances, or* Ideas *of things without; would the Pictures coming into such a dark Room but stay there, and lie so orderly as to be found upon occasion, it would very much resemble the Understanding of a Man, in reference to all Objects of sight, and the* Ideas *of them.*"[431]

These few passages already suggest a rather clear picture of how John Locke, and subsequently EAN, conceive of the cognitive process of man: the *sensations* come *from the things* and enter the *passive* mind already *as* "*insights*," just as in a *camera obscura*. Locke keeps alternating between the mental and (whenever the *materialism* surfaces that actually underlies his thinking) the extra-mental sphere. Moreover, there is his description of the mind as an *empty dark cabinet* where "*resemblances* (!) … *of things*" are let in, which rather suggests copies. In this context, it is really interesting to compare the metaphors used by Locke and Descartes, respectively, to describe our mind, our reason. While Locke speaks of a *dark room* or a *camera obscura*, a dark cabinet, into which all relevant information is passively absorbed, Descartes speaks of the *natural light* – innate reason – that always shines from within, and without which everything would be just dark! The difference between empiricism and rationalism can hardly be expressed more drastically than by this contrast – for Locke the dark *camera obscura* that reproduces the world of things which are much more relevant than the mind, for Descartes the active *natural light* of reason without which no light could be thrown upon everything else but in whose light everything is illuminated.

Another notable point is that Locke suddenly not only speaks of *resemblances* rather than simple, brick-like ideas that are transformed sense experiences, but even suggests that if these pictures could be deposited

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429 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II. i. 9, p. 57.

430 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II. ii. 25, p. 63.

431 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II. xi. 17, p. 96.

"*so orderly*" in this cabinet, "*it would very much resemble the Understanding of a Man*." Thus, for Locke, the understanding is nothing but a *dark cabinet* where dusty *pictures* are stored! Also, and interestingly, given the subject of our study, in his careless use of the metaphor, Locke actually succumbs to the power of images, the visual. Similar passages can also be found in Descartes when he speaks of the pictures imagined by him, regardless of the concept of idea he normally uses. Actually, since Locke aims to establish a system of representing simple and complex ideas, he should speak of sensations and ideas rather than things and "*resemblances*." But there it is in black and white: it is *pictures* that the things "*obtrude … upon our minds*," which is more or less in line with the materialist theory of a photographic copy-process. This, however, would imply a complete break with his construction of a representationalist system of ideas. In the tradition of English empiricism, this concept, i.e. the *passive reception* of the *given* in the form of impressions and the *retrospective* association of these impressions by means of practice-oriented custom and the attaching of names to the ideas thus obtained, was later adopted and further enlarged upon by David Hume.[432] The foundational idea of "given" impressions that are supposed to be able to adequately reproduce the things and obtrude themselves upon the *passive mind* which, then, performs logical transformations with these atomistic building bricks in its dark cabinet (reasoning) was later also adopted by the exponents of positivism such as Ernst Mach, by Moritz Schlick and the Vienna Circle, but most notably by Edward Moore and Bertrand Russell, and confirmed by Alfred Ayer, and never fundamentally revised by analytic philosophy.

This basic deficiency of empiricist philosophy has repeatedly been commented on by Ernst Cassirer:

"*Thus the sensationalists do not mean to deny the factor of signification in the particular perception, but, true to their basic trend, they attempt to explain this factor by composing it from particular sensory elements. They strive to make the spiritual form intelligible by transforming it back into sensuous matter; by showing how the mere coexistence and empirical concrescence of sense impressions suffices to produce this form or at least an image of it. So seen, it is true, this image remains a fiction: the image itself has no form of truth; truth and reality are imputed only to the substantial elements from which it is pieced together like a mosaic.*"[433]

What Cassirer describes here is the tacit, unconscious infusion of meaning into the sensory impressions, that is, the idea that *meaning* and *function* could somehow be read off from sensory perception rather than be gener-

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[432] David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975.

[433] Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 192.

ated by thinking. This apparently works whenever we *already know* the meaning: we see "the red ball" – of course we do, since we already know how to isolate it in the field of vision and how to apply the concept which contains the rule how to think a ball and we know the *function* of the red object.

So much for the aporias regarding the "*simple ideas*." Let's now turn to their assembled form, the "*complex ideas*." There are dozens of ambiguous, contradictory and unclear passages in this Book II of the Essay, and there are myriads of articles and books where they are minutely discussed, which makes it difficult for me to deal with them in detail without going beyond the scope of the present study.[434] Nevertheless, examining the *complex ideas* is crucial for any criticism of EAN. For deep down, what empiricism really wants is to be a *materialism of things*, to be "out there" with the palpable things, and it hates the fact that is has to continually remind itself of its commitment to representation. Thus, Locke occasionally forgets that direct copying is prohibited. Bertrand Russell, too, often unwittingly alternates between some naïve subtextual realism and the self-exhortation to stick to representation, most notably in "*Our knowledge of the external world*." And, last but not least, there is Leibniz to accuse Locke of wanting to introduce materialism by the back door.[435] This is also true for the image of the *passive* mind, the *blank slate*, all of which is testament to the strong impulse to anchor the "*center of gravity*," the *active part* of the cognitive process, in the "external" things and, then, to somehow introduce thinking in terms of *operations* in a "building-block system" mode. For the so-called *operations of the mind* are very much needed since according to the doctrine, only *simple ideas* can be assimilated whereas it is *complex ideas* that are involved in 99,99 % of our operations in everyday life. However, the need to assume a mechanism or a simple model for a building brick-like assemblage of the incoming *simple ideas* creates new problems for Locke. For the mind cannot be observed, and while it is principally beyond the dogma of *sense experience*, it is nev-

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434 From my point of view, this is best done by Richard I. Aaron, John Locke, Claren-don Press, Oxford 1965, Alfred Klemmt, John Locke, Meisenheim/Glan 1952; Alexander Campbell Fraser, Locke, Edinburgh 1890 (Nachdruck 2012); John L. Mackie, Problems from Locke, Clarendon Press Oxford 1976; James Gibson, Locke's theory of knowledge and its historical relations, Cambridge 2010 (1917), John W. Yolton, Locke and the Compass of Human Understanding, Cambridge University Press Cambridge 1970; John W. Yolton, Journal of the History of Philosophy, Volume 1, Number 1, October 1963, pp. 53–71; Udo Thiel (ed.): John Locke, Essay über den menschlichen Verstand, Klassiker auslegen, Berlin 2008; Martin Lenz, John Locke, in: Dominik Perler, Johannes Haag (eds.), Ideen, Repräsentationalismus in der frühen Neuzeit, Berlin/New York 2010.

435 Cf. Nicholas Jolley, Leibniz and Locke: A Study on the New Essays on Human Understanding, Oxford, Oxford University Press 1984.

ertheless badly needed to explain the presence of *complex ideas*. This is why Locke's description of the *operations of the mind* remains particularly vague.

He does, however, occasionally suggest that we are indeed able to *observe* these operations of the mind, which is, of course, rather disconcerting:

"*When the Mind turns its view inwards upon it self, and contemplates its own Actions,* Thinking *is the first that occurs* …" And according to Locke there are "… *some few instances of those various* Modes of thinking, *which the Mind may observe in itself, and so have as distinct* Ideas *of, as it hath of* White *and* Red, *a* Square *or a* Circle."[436]

With these reflections, Locke becomes increasingly entangled in inextricable problems. Firstly, it should be noted that he treats white and red the same as a square and a circle. Red, at least in Locke's doctrine, is a "*simple idea*." But a square, of course, has a plurality of perceptible "simple ideas," e.g. *corner*, *side*, *equality*, *area*, *internal angle*, *parallel*, etc., which need to be *organized* and *integrated by thinking* before a correct understanding of a "square" is at all possible. But the *proportions* and *relations* of sides and angles cannot be read off from the particular ideas! Here, Locke would argue that it is a *complex idea* that has been assembled from the *simple ideas*. But does the mind form the idea of a square by collecting particular ideas from any number of observations without considering relations? For how long must a square be observed and sense experiences be collected before we can understand the essential relations? Isn't it rather by *intuitive* grasping, the sudden insight – "ah, there are four sides of *equal* length and they are at right angles to each other, and the four angles are *equal*, it's a square," etc.? How do I obtain the *diagonal* of the square if I can never before have had a sensory perception of it and first *need to draw* it? We will come back to this issue in our discussion of Plato's Meno.

Clearly, insight cannot occur unless both factors, i.e., in Kantian terms, intuition and understanding, are brought together, unless there is synthesis. But this assembling of *simple ideas* into *complex ideas* does not happen with the mind observing itself in the way one might observe a machine assembling some metal pieces. (Incidentally, there is a peculiar propensity in empiricism to say "*we*" whenever the cognitive achievement of the mind is to be blanked out. This technique is also found in Hume who tends to fall back, in these cases, on phrases such as: "we notice…," "we may observe…" or "we always find …" This technique avoids referring to the self, the *I* and its reflective thinking, as the source of insight. It is not the understanding that has this insight, nor is it the mind, it is a

[436] John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II. xix. 1 and 2, p. 134f.

"we" that observes. Also, we do not think, we observe, we notice. This is why the utmost vigilance is called for when Locke, Hume or Russell (as well as Popper) start a sentence by saying "we." The same is true for the phrase "*nothing but*." Whenever Locke or Hume write a sentence that includes "*nothing but*," we can be sure that the content in question is problematic!). Thus, O'Connor rightly notes with respect to the description of the activity of reflection:

"*Thus for Locke's doctrine of reflection to be justified, we have to justify not only the possibility and reliability of introspection but also the notion of mental acts or operations. Moreover, Locke apparently failed to realize that he could not make a distinction between reflection and the ordinary reflex awareness which he alleged to accompany every mental state without having to amend his doctrine of sensation.*"[437]

Obviously, an internal perception of the *operations of the mind* as a second source of knowledge cannot be put on a level with the mode of perception of the first source, the *simple* and *complex ideas*. We may perhaps somehow receive particular ideas but we cannot observe the *operations of the mind* themselves. And now things get really bad:

"*But if the mind cannot acquire ideas of reflection without a special mental activity of 'taking notice of' its own operations, how can it acquire ideas of sensation without an analogous process of 'taking notice of' those ideas?*"[438]

This means: if we are unable to describe this mode of this internal self-observation of the mind which, in Locke, is clearly posited as a form of *observation* (!), how, then, are we supposed to be able to read off, from the postulated internal source of cognition, the *complex ideas* assembled by the *operations of the mind*? At this point, even O'Connor, arrives at the conclusion that Locke's entire conception of the *operations of the mind* as a second source of cognition and the ideas thus perceived is a failure. But how are we to concretely imagine this interplay between the "*operations of the mind*" and the atomistic building bricks, i.e. the *simple ideas*, always presuming that the *blank slate*, that is, the unstructured *empty plate* is at all capable of it? O'Connor offers a very descriptive account of the *modus operandi* of this system (and Locke may well have thought along these lines):

"*It may be that the final products of experience when worked on by a developed human mind will no more resemble the ideas of sensation and reflection from which they originated than a motor car will resemble the original steel, copper, rubber, cellulose, etc., from which it was constructed. But in the one case, as in the other, the process of*

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437 D.J. O'Connor, John Locke, Penguin Books, London 1952, p. 98f.

438 D.J. O'Connor, John Locke, loc. cit.

*manufacture, so to speak, has not created any new materials: it has merely taken the original materials and given them a new shape and order.*"[439]

One increasingly gains the impression that the mind is supposed to just pick and, then, assemble the *simple ideas* "such as they are," like building blocks in a building-block system where various primary *properties*, e.g. "white," "cold" or "hard," are already immanently given. Among these building blocks, there is no internal dynamic-systemic connection, and their essential or structural unity is like that of salt as referred to by Hegel: "white, and also cubical, also tart" – that is, made up of determinations of the mind that, at first, are indifferent towards each other but must at the same time be in some relation *among each other* if the result is to be the concept of salt.[440] In Locke, these ideas hang on the unknowable *substance* like berries on a bush, ready for picking. This means ignoring the entire *function* of the thing in its determination as different from the particular "building blocks" which, contrary to the assumption that they only stream in as *particular perceptions*, are not "free-floating" but form a unit with this thing and its functions. It means ignoring everything that pertains to and is behind the *function* and the systemic *structure* of a thing just as, in the above example of the car, innovation, the synthesis of novel materials, the totality of scientific-technical knowledge is behind the process of constructing a motor. It means ignoring the whole part of thinking. What is taken into account is only what is *externally* given and, then, assembled: bolts and screws, leather, metals, that is, all that is perceptible to the senses, ready for use as in a box of spare parts, without reflecting the conceptual achievements that are behind the whole process and define the car's performance. Even a "charitable" empiricist such as James Gibson has to admit that this naïve way of assembling *simple ideas* into *complex ideas* in terms of a "*conception of a quasi-mechanical composition*" is indefensible:

"*It is evident that the composition theory, strictly interpreted, breaks down even in relation to the complex ideas which are so formed; since it cannot account for recognition of the unity of the whole, which they have been found to involve. The complex idea, accordingly, cannot be regarded as resolvable without remainder into simple ideas which enter into its constitution. The failure of the composition theory becomes, however, much more conspicuous when we find that 'compounding' is not the only mental operation which gives rise to complex ideas.*"[441]

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439 D.J. O'Connor, John Locke, Penguin Books, London 1952, p. 42.

440 Georg Wilhelm Friedrich Hegel, Phenomenology of Spirit, Oxford University Press 1977, p. 73.

441 James Gibson, Locke's Theory of Knowledge and its Historical Relations, Cambridge 2010 (1917), p. 63.

For this assemblage of the simple "building bricks of ideas" not only lacks a meaningful plan (beyond the idea of *unity* which, as Gibson quite rightly notes, is of course not given with the particular building bricks). It even requires further capabilities such as *comparing* and *abstracting* that largely transcend the *passive*(!) *perception* of complex ideas from the observation of the internal "operations of the mind." As a logical consequence, this leads to the central problem of the *theory of abstraction* in EAN. For if, as serious thinking will invariably show, the *universal* cannot be already given in the always particular sense experiences and the *simple ideas* that are abstracted from them, how, then, are we to arrive at universal concepts and ideas? The flawed abstraction process of EAN will be dealt with at the end of this chapter, but these examples already allow us to see quite clearly why this magical transformation from simple idea into abstract and universal concepts is desperately needed to save the basic dogma of EAN. Gibson (1917) already had a foreboding that this deficiency is beyond repair:

"*In the first place, then, it must be noticed that general ideas, like ideas of relation, can never be presented as such in experience, the objects of which are always concrete and particular.*"[442]

It obviously doesn't suffice to assemble particular ideas that have been translated from sense experiences, for there are many concepts such as, for example, recognition, federal law or amortization, that, at any rate, cannot be directly traced back to *sense experience*. Locke therefore needs to show that *all* these concepts also stem from *sense experiences* or can at least be derived from them through the workings of the "dark cabinet." His construction of *simple ideas* and *complex ideas*, already questionable as such, becomes particularly precarious when he deals with the "*mixed modes*," that is, the farther the concepts depart from the sensualistic basis. It will be shown that, clearly, functions and relations can only be products of the mind and can never be "abstracted" from the sensory world in the simple mechanistic way proposed by Locke. O'Connor diagnoses:

"*The implausibility of treating relations as complex ideas is only too patent. The difficulty is then to preserve Locke's consistency as empiricist. Is it possible to derive ideas of relations from our experiences in sensations or reflection? It is clear, I think, that Locke himself was worried on this point…*"[443]

With the dogma in mind, the concern of the empiricism-minded author here is not with the inconsistencies and impossible processes we have already found, his concern is uniquely with the question whether Locke's

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442 James Gibson, Locke's Theory of Knowledge and its Historical Relations, Cambridge 2010 (1917), p. 67f.

443 D.J. O'Connor, John Locke, Penguin Books, London 1952, p. 58.

"*consistency as empiricist*" can be preserved, that is, whether there is danger for the dogma. In his analysis, O'Connor concludes that when it comes to relations, that is, the relations among the things that are established by thinking, Locke's philosophy more or less breaks down:

"*The upshot of Locke's account of ideas of relation is no more than this: We derive our ideas of relation from the mental act of comparing other ideas, simple or complex. It is natural to the understanding to 'look beyond' its immediate object 'to see how it stands in conformity to any other' (II.xxv.1). Any comparison of two ideas in this way can give rise to the idea of relation. Nevertheless this idea is not 'contained in the real existence of things, but something extraneous and super–induced' (II.xxv.8).*"

O'Connor then invokes three major concerns:

1) *Does the mind come to know relations between ideas in the way that it comes to know general principles, viz.: by observing instances and grasping the principle which the instances exemplify?*
2) *Does Locke mean by the phrase* extraneous and super-induced *that relations have mental existence only with no objective counterpart in the things related? He does talk in an unguarded moment, of relations 'having no other reality but what they have in the minds of men'.*
3) *If this is so, are we to draw any distinction between 'relations' and 'ideas of relations'?*[444]

This passage is critically important because it clearly shows that as soon as the *particular simple ideas* that stem from sense experience interrelate *with each other* or *with something else*, they need to be retrospectively supplemented by some additional element that is *not inherent in them*, something that is not given *in this way* with the things but added. It again and again becomes obvious that it is definitely the mind that *by thinking* needs to establish the relations among the particular elements and the totality of the *functions* of things and processes and cannot read them off, by observation, from the "*given*" (just as the development, the processes of synthesis and the blueprint of the car in the above example cannot be substituted by listing the spare parts). Point 1) once again reveals the figure of the empiricist *self-deception* that keeps insisting that universal principles can be ascertained by observing particular *instances* and, in the process, grasping the universal principle. It further alerts to the difficulties of understanding what this "*grasping*" is supposed to mean; that is, the very process of gaining *insight*, of transcending the particular towards the universal, this moment of *intuitive, rational insight*, the *integration by think-*

444 D.J. O'Connor, John Locke, Penguin Books, London 1952, p. 59f.

*ing*, the *seeing of two as one*, the *synthesis*.[445] At the same time, O'Connor himself uses the term "*grasping*" in Point 1). However, the idea that *universal* laws can be obtained by the *observation*, be it ever so frequent, of particular things remains as absurd and impracticable as the fly in the fly glass. It is by pure thinking alone, by the progressive gaining of insights through thinking, by a change of perspective, by going further and beyond, by synthesis, that new knowledge can emerge.

The other inconsistency, addressed by O'Connor in Point 2), is the fact that these relations are "*only*" thought and might therefore lose their connection to the things. In this context, he inadvertently offers an observation that is of particular importance for our topic:

"*He does talk in an unguarded moment, of relations* 'having no other reality but what they have in the minds of men'." (loc. cit., p. 60)

Thus he assumes that Locke, in this "*unguarded moment*," actually suggests that all these relations could "only" be products of the human mind although they are supposed to simply reproduce the relations among the things, the so-called "*facts*," as Wittgenstein still believed. This remark is very helpful in two respects. Firstly, an empiricist mastermind confirms that all *relations* and, deducible from them, all functions, laws and processes *are only in the thinking of men* and not in the things. But since, on the one hand, Locke's conception of the cognitive process is based on the tenet that both *simple ideas* and *complex ideas* are in the things such as we perceive them (thus realizing the materialism which lies at the bottom of it), and since, as a consequence, these particular perceptions need to be ordered in a way that allows for their relations to conform to the relations among the things while, on the other, he clearly asserts that these relations within and among the things have their reality in the human mind (which is actually the correct rationalistic position), a deep crack opens up in his whole doctrine. Locke keeps alternating between the occasional reminder that what is at stake is a representative system, and an inner propensity to realism or materialism.

Secondly, the observation concerning the "*unguarded moment*" is highly informative because it at one stroke exposes the disingenuous ways of empiricism. Deep down, they know that the whole argumentation is flawed and inconsistent, yet they reject rationalism for ideological, biographical, political reasons, or because it is simply too complicated or whatever the reason may be. EAN then implements the two strategies already mentioned: they regularly engage in yet another attempt to somehow and in spite of everything make the empiricist doctrine fully seawor-

[445] This process of grasping, of the direct intuitive insight in the moment we understand, is argued by Laurence Bonjour in his In Defense of Pure Reason, Cambridge University Press, Cambridge 1998, p. 105ff.

thy,[446] they keep tinkering about with the construct of the never-to-be-finished EAN ship, a wreck adrift on the seven seas, and, then, as described in the definition by Stanford Encyclopedia, launch strategy no. 2, i.e., attack the exponents of rationalism, most notably Plato and Descartes, but also Kant and Hegel. But then, in some "*unguarded moments*," someone slips and intimates that they actually know what is really the case, namely, that the relations and functions can of course not be read off from sense experience, that it is our mind alone that is capable of creating new knowledge, the universal, the laws, and that we never know the things directly but only by the functions and determinations that the mind provides. But right after having exposed themselves in this embarrassing "*unguarded moment*," they promptly revert to the empiricist dual strategy.

So, we have been able to demonstrate that Locke's theory of perception, based as it is on *simple* and *complex ideas*, is deficient and simply not functional for many major reasons, and that the second source of knowledge postulated by him, the *operations of the mind*, are in more than one way unable to fulfill the function set out for them in the context of the theory of *simple* and *complex ideas*, nor are they internally *observable*. As for Locke's theory of *primary* and *secondary qualities*, I will refrain from discussing it because it has been extensively dealt with in the respective literature. J.D. Mabbott comes to the following conclusion:

"*Locke's theory of simple and complex ideas had no lasting influence and no recent successors. Hume echoed his analysis of spatial and temporal experience into* minima sensibilia*. But later empiricists did not pursue the method of analysis as Locke did. Yet any empiricist theory of our awareness of characteristics is bound to face this issue.*"[447]

In short, what Mabbott says here is: yes, Locke's doctrine was a dead end, it had no effect, Hume tried something similar and later empiricists ceased to really consider it, but it is a problem that *every empiricist* theory has to face. So – has the problem been solved then?

Even James Gibson who is basically willing to come to Locke's defense and seeks to upgrade his image as against Kant and Leibniz (it's the time of World War I!) states that while Locke's conception of *simple* and *complex ideas* is indeed a clear failure, it has never been unambiguously *revoked*:

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[446] A case in point: Lorenz Krüger, Der Begriff des Empirismus, Berlin/New York 1979. The basic figure of this attempt, constantly reiterated, is as follows: 'Locke tries to show this or that but it remains aporetic. Possible solutions come to mind provided this and that was accepted. This, however, is impossible for one reason or the other. Nevertheless, one must continue to work at empiricism to save the good principle.' And off they go into a new round…

[447] J.D. Mabbott, John Locke, The Macmillan Press, London 1973, p. 21.

"*But while Locke began by accepting the current composition theory as a matter of it, and while its distinction of simple and complex professedly underlies his whole discussion of ideas in the Second Book of the Essay, he makes no attempt to carry out a strict application of its implications, or to force its a priori scheme upon a refractory material. When, as soon happens, it proves inadequate for the comprehension of the content of our ideas, it is tacitly abandoned, though never formally withdrawn.*"[448]

This evaluation is helpful in more than one respect. For one thing, it confirms the indefensibility of empiricism, and for another, it suggests that in Book III and, more specifically, Book IV Locke *tacitly abandons* this theory rather than consistently consolidate it. Also, it highlights a recurrent attitude in empiricism. Seeking to build a consistent and conclusive theory in accordance with their indefensible basic dogma, empiricists are time and again obliged to admit that due to immanent logical inconsistencies, the "equation" does not work. But instead of *revoking* it clearly and distinctly, they *tacitly abandon* the imperfect work and resume their carpentering at some other part of the wreck.

In his book "*Der Begriff des Empirismus*," conceived as a large-scale modern effort to salvage empiricism, Lorenz Krüger comes to the following conclusion:

"*This is the key point of Kambartel's criticism, namely that the 'basic experience, when consistently thought through, remains entirely indeterminate and indeterminable'. So I can base myself on his detailed justification when I come to the conclusion, for this point of the argumentation, that an experiential basis that defies being captured by language is inappropriate for use as an explicitly concrete foundation of an explicitly specifiable way of forming ideas and building knowledge, i.e. as a 'basis'. But it is precisely such an explicit description that Locke wanted to give, and gave.*"[449]

Thus, Locke's approach has been officially discarded even by authors trying to come to its rescue. In his book, Lorenz Krüger then attempts to clear a *last way to salvage empiricism* by first resorting to *language* and, when language turns out to be inadequate as a means of doing what one would expect it to do given the empiricist doctrine of *sense experience*, to *ostensive* procedures, i.e. the *pointing at* things as a way for them to be understood. But with respect to the subject of our study, this shift precisely propels him into the target area, for, paradoxically, *ostensive*, *silent pointing* actually appeals to *visual thinking*, an *understanding of function* without language. When we silently *point* to something and hope that our counterpart will understand us, we precisely assume that they will be able to understand the respective fact even without language. But *how*, or *in what medium*, do we think if language is unable to explain the fact at

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448 James Gibson, Locke's Theory of Knowledge and its Historical Relations, Cambridge 2010 (1917), p. 49f.

449 Lorenz Krüger, Der Begriff des Empirismus, Berlin/New York 1973, p. 23.

hand, causing us to resort to pointing? Moreover, pointing itself is of course already a *universal* and tacitly appeals to the universal (the mind) in the recipient. Hegel already unmasked the "this" of pointing as a *universal* in his chapter on "*Sense-Certainty*," but probably Krüger, as well as Wittgenstein before him, never read *The Phenomenology of Spirit*. Thus, whoever seeks to signify something by pointing does not save empiricism but rather demonstrates that the *universal* is necessarily invoked even at this unsophisticated level! So let me conclude by once more confirming the breakdown of Locke's *Theory of Ideas* and, with it, the empiricist-sensualist way of constructing a basis for knowledge from *simple* and *complex ideas* and, hence, the impossibility for universal and abstracts concepts to be obtained by *sense experience* alone and without innate knowledge.

### Abstraction process and universal concepts in empiricism

A third, and last, important issue to address in the context of a criticism of empiricism is Locke's *theory of abstraction* since it is a prime example of *how* universal and abstract concepts are supposed, in empiricism but also materialism, realism and naturalism, to be formed from *sense experiences* that come from the outside and appear to be *directly* copied. As this form of *self-deception* is a permanent feature of EAN writings, a critical examination of the "abstraction of concepts from sense experiences" is obviously important. But before going into Locke's method of abstraction, I would like to quote a reflection by Hegel that runs contrary to the way *abstraction* is usually conceived of today. In 1807, Hegel had written a short article entitled: "Who thinks abstractly?" ("Wer denkt abstrakt?"; Jenaer Schriften, published posthumously) that essentially is a description of an execution:

"*A murderer is led to the place of execution. For the common populace he is nothing but a murderer. Ladies perhaps remark that he is a strong, handsome, interesting man. ... One who knows men traces the development of the criminal's mind: he finds in his history, in his education, a bad family relationship between his father and mother, some tremendous harshness after this human being had done some minor wrong, so he became embittered against the social order ... This is abstract thinking: to see nothing in the murderer except the abstract fact that he is a murderer, and to annul all other human essence in him with this simple quality*."[450]

Hegel's use of the conceptual pair "abstract – concrete" runs counter to its EAN use. In EAN, *abstract* is what is inductively extracted from the

[450] Georg Wilhelm Friedrich Hegel, Who thinks abstractly?, in: Walter Kaufmann, Hegel: Texts and Commentary; Garden City, NY: Anchor Books 1966, pp. 113–118; accessed at: Hegel-by-HyperText, https://www.marxists.org/reference/archive/hegel/works/se/abstract.htm

hodgepodge of *particular sense experiences* and "*simple ideas*" – which are presupposed to be similar and are empirically taken in without any a priori concept of similarity – and given a name. It is also supposed to be the peak of the conceptual pyramid. For Hegel, in contrast, the supreme and, at the same time, "*most real*" level of knowledge is *concretion*, whereas *abstraction* is the emptiest one. For what is *concrete*, "*contracted*," is knowledge where all the determinations are *real*, and are concretely realized and determined in accordance with the *systemic function* of the thing and the concept. Abstraction means that *one* determination among many others is selected with *respect* to an essential *aspect* of the context, and it is the situation, the choice, the *point of view*, that is, the *positing* done by the mind that determines which of the many properties or determinations of the object is selected. With a murderer, the focus is on the deed, the breach of law and the conviction and, therefore, the "abstraction": murderer.

But Hegel also points out that the *concrete man*, being the totality of a life history, may have a variety of determinations and properties for he may concretely *also* have been a handsome, interesting man, *also* a father, *also* a brave soldier and patriot, *also* a masterly craftsman, whereas what adheres to him now is the sole abstraction "murderer." So, what something means may vary depending on the *point of view*, and abstracting a single aspect or attribute from the overall context of a concrete system and taking it as the chief defining feature is, therefore, reductionist. There have been freedom fighters and national heroes who were also murderers, such as, for instance, Wilhelm Tell who killed the governor because of a personal feud. While EAN seeks to *assign* exactly *one* meaning to each concept (e.g. Frege's mathematics-based unary concept of function where, just as in a functional equation, there is always exactly one y that is assigned to exactly one x) and, thus, to create a universe of unambiguous, one-to-one attributable relations between sensory copies and names, concrete reality is not that easy to organize but has a highly complex network structure that cannot be broken down into units that exactly correspond to the "red ball," the "green tie" and the "blue bottle." Confronted with a range of smartphones, I can sort and group them according to color, size or form and many other *visible features* (*sense experience*), but it may make more sense to go by their *functionality*, or their *performance*, or their *price*.

The next issue to be considered is what exactly happens in the abstraction process and *how* abstraction is achieved in the distinction and determination process since, strictly speaking, even grouping objects by *similarity* always already implies some *prior knowledge* and a variety of thought processes. Furthermore, there are *features* we need to distinguish and grasp and determine according to their *function* in a way we can already learn from Plato. And we need to consider that even singling out a

*feature* already implies a determination procedure that, in turn, is guided by a particular *point of view*, or *respect* (Descartes). Here, some clarification is required, for which I will rely on the explanations given by Ernst Cassirer, Guido Kreis, Arbogast Schmitt and Gyburg Radke-Uhlman. The primary aim of these thinkers is, first, to unmask a naïve view of the abstraction process that is a failure from the very start since it rests on the illusion that the *features* are *immediately*, *directly* represented; and, then, to explain the actual course of the rational process of cognition qua *function*. So let's first consider the Platonist tradition of concept formation. Gyburg Radke-Uhlmann offers a step-by-step explanation of the actual genesis of the concept in the perceptual process:

"*To say and believe that in perception, we have before us things that are entities which cannot be further broken down and are exactly and exclusively that as which we can name them by saying, for instance, that what we see is a table is a quite undifferentiated way of speaking … Actually, not everything of what we called a table is also what we meant by this word … In this something, no particular feature that would answer to our understanding of a table can ever be distinguished by a perceptual sense: namely something fulfilling the function that we can put things on it, that we can sit at it and write at it.*"

Thus, Gyburg Radke-Uhlmann already suggests that in the final analysis, it is the understanding of the *function* of an object that needs to be presupposed for us to be able to distinguish the particular *features* and assess their significance *with respect to function*:

"*What we can see and touch is only certain qualities of certain materials, in this case wood and metal, which are organized in a way that allows them to fulfill this particular function. In other words: rather than having before us objects, i.e. tables or houses etc., we can always only see materials that are organized and assembled in a certain way and in view of a certain function. Therefore, we need to distinguish between the material and the nature of the organization that guides our naming of various functional entities. Functions and modes of synthesis cannot be perceived by the senses but can only be grasped by thinking. The insight that the concrete entities that apparently present themselves in this clarity and self-evidence are not absolute entities at all that can be recognized as certain things but are compounds of something that can be perceived and something that can only be grasped by thinking – this insight precludes any possibility of grounding knowledge on a purely empirical basis.*"[451]

Thus, *rationalist* thinking assumes that we perceive things by means of concepts in terms of their *function*, which is never seen but always "only" thought. This *function* is a system of specific and essential connections and relations and can expand, become differentiated and change with our growing understanding of it. This general and logical *function*, the *cutting*

[451] Gyburg Radke, Platons Ideenlehre, in: F. Gniffke, N. Herold (eds.), Klassische Fragen der Philosophiegeschichte I, Münster 2002, p. 24f.

*function* of scissors, the *locking function* of the lock, the *nourishing function* of bread, is not "given," nor is it defined by *sense experience*, it is *generated* by our understanding in the process of progressively grasping it. Regarding the example discussed in the previous chapter, i.e. the assemblage of the components of a car, it becomes clear that to understand the assemblage of a car from the perspective of individual components alone is to ignore all those mental activities that pertain to *function*, *technological development* and *creativity*. This is why, in this example, the EAN-committed thinker only refers to the components of the car because for him, these concrete things are all that comes to mind in this context while the tests, the development work, logical thinking and the creativity that were necessary for developing each of these components in view of the functions and relations of a car are not taken into account. From this perspective, a car is not the result of years of inventions and development work but just a bundle of individual components that need to be assembled (just as the table in an earlier example is understood as a composite of materials rather than by its function). And this is true for the grasping of all objects where insight is guided by *sense experience* alone rather than *function*.

Let's now contrast the concept of *function* with the explanation of the abstraction process offered by John Locke. Of course, this explanation is conceived along the lines of his empiricist approach of *simple ideas* that are perceived by an entirely passive mind, so the task for him is to develop a logical and consistent explanation of *HOW* to proceed from this "basis" to *universal* and *abstract* concepts. This is a pervasive problem in all of EAN philosophy, with David Hume as its most extreme case, and also the reason why most EAN authors pursue a paradigmatic dual strategy when presenting their doctrine: they first try to show that methodologically, Plato's doctrine (and, therefore, that of *rationalism*) is a failure and, focusing on its *mythical aspects* as discussed above, vilify it as a "*high-flown metaphysical position*."[452] This allows them to discard the rationalistic solution of the problem, i.e. Plato's doctrine of forms, from the very start, which leaves the empiricist solution, however flawed, as the one and only option that remains; whereupon they get back to empiricism's signature repair work. Locke himself seems not to have been aware of the problem until rather late in his work, and so it is only in Book III of the Essay – "Words" – that he offers his explanation of how abstract concepts are formed. John L. Mackie explains:

"*Locke's basic theory of abstraction and generality is stated thus:* (III. iii. 6)*… the mind makes the particular ideas received from particular objects to become general;*

[452] John J. Jenkins, Understanding Locke, Edinburgh University Press, Edinburgh 1983, p. 170.

*which is done by considering them as they are in the mind such appearances, separate from all other existences and the circumstances of real existence, as time, place, or any other concomitant ideas. This is called ABSTRACTION, whereby ideas taken from particular beings become general representatives of all of the same kind; …Thus the same colour being observed today in chalk or snow, which the mind yesterday received from milk, it considers that appearance alone, makes it a representative of all of that kind; and having given it the name whiteness, it by that sound signifies the same quality wheresoever to be imagined or met with; and thus universals, whether ideas or terms, are made.*"[453]

J.J. Jenkins, in turn, defines Locke's theory of abstraction as follows:

"*The word is not self-explanatory, but what Locke means is that we 'extract' from a number of objects the features that they have in common, ignoring those that are peculiar to each, and we put these features together so as to compose a general idea.*"[454]

For J.J. Jenkins, the positive – and foremost – aspect of Locke's explanation of the problem of abstraction is that notwithstanding all its flaws, it is *truly empiricist*:

"*Perhaps the most important thing to note about this account is that no matter what shortcomings it may have – and we shall be looking at some of these below – it is a truly empiricist attempt to explain how abstraction is possible.*"[455]

This is an attitude we are by now well familiar with: in terms of methodology, the argumentation as such may be profoundly problematic and inconsistent ("*shortcomings*"), but as long as it is truly *empiricist*, all is well. According to Jenkins, the core element of Locke's process of abstraction is a *two-stage process*:

1. *omission* and 2. *selective attention*.

Thus, Locke's reasoning appears to be as follows: yesterday I saw a stick of chalk, then some snow, then today some milk, and now, in a first step – in line with empiricist doctrine – I *perceive* (it should be noted that in empiricism, the term "notice" is often found where actually there is defining thinking) that all three objects are in some way *similar*. In a second step, I *selectively* direct my *attention* to the fact that all three objects have a certain *feature* in common, namely *whiteness*, which implies that if I already know the chalk, the milk and the snow, I of course also already know "*white*" *as a color* already (for such is the premise that is always tacitly assumed by empiricism). This act of *selective attention* is followed

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453 John L. Mackie, Problems from Locke, Clarendon Press Oxford 1976, p. 107f.

454 John J. Jenkins, Understanding Locke, Edinburgh University Press, Edinburgh 1983, p. 172.

455 John J. Jenkins, Understanding Locke, Edinburgh University Press, Edinburgh 1983, p. 169.

by a third step where I *isolate* this color "white" by *omitting* all the other features of the three objects, and a fourth step of definition where I *select* it as the one that represents all objects that are *similar* with respect to this feature, that is, as a kind of *proxy*. So it is something *particular* that "represents" many particulars as a *universal*. Now, I strongly suspect that it was exactly the other way round, namely that Locke already knew "white" as a color and, to suit his purpose, collected three objects everybody knows and whose color – white (different shades of "white," it is true, but still) – is only too obvious. The complicated debate about what *similarity* is, in the first place, and of how to define and determine this *similarity* when there is no concept of *identity* and *difference*, will be treated later in this book. At present, I will not discuss it any further although this would strongly suggest itself since stating *similarity* of course already presupposes the concept of "white"-in-itself.

But what is more important here is that Locke's example seems so plausible only because the objects are, per se, relatively familiar in terms of their *function* or, in other words, because we *already know them*, and the suggestive effect of Locke's empiricist example is due to the fact that by all appearances, "whiteness" seems to be the most plausible feature for defining the similarity of the three objects chalk, milk and snow and, even more notably, because we also already know the *feature of "whiteness."* If Locke had chosen milk, feta cheese and yogurt as an example, it would still be possible to direct one's *selective attention* to "whiteness," that is, the visible color, and thus to serve empiricism in the *sensualist way*, but in this case the "nasty-minded" rationalist is more likely to select a perhaps more meaningful and appropriate *function*-based abstraction such as "food" or even "dairy product"! But this implies that the universal, non-visible *function* of the three objects, namely to be a "man-produced dairy product," is *a priori* understood and serves, in a logical process of definition, to separate from these foodstuffs all the accidental elements that are not part of the essential function. Thus, the *essential function* is prioritized over the *non-essential function*, and "whiteness," previously the main feature, loses in importance and becomes accidental as against the *function* of being food. It thus becomes quickly evident that, firstly, the *similarity* or, even more extreme, *likeness* of objects is not *immediately given* with the sense experience we have of these objects but necessarily implies *a priori* understanding of the concept of similarity; and, secondly, that the *point of view* from which the abstraction is done is not automatically given with *sense experience* alone but again depends on *prior knowledge* and the *purpose* or *point of view* that serves to channel the definition. Thirdly, in the abstraction process, the particular *features* are not treated *equally*. Rather, those connections that are *essential* to the relevant *function* are prioritized against those that are not (dairy product or foodstuff against the color

white). All this, however, already implies quite different logical steps and definitions, that is, a form of *selective perception* as well as a form of *attention* where all those particular features that are only perceived by the senses are eliminated until one understands that the purified abstraction has been achieved.

Or, as another example that allows us to shed light on this approach, take pills: pills, too, could be grouped by their color or their external form, that is, by external *similarity* based on empirical *sense experience*. It would, however, seem more to the point to group them not by their visible external *similarity* but by their therapeutic *function*, e.g. antibiotic, diuretic, cancer therapeutic, that is, by something that is "only" *thought*. For *sense experience* might mislead you into grouping the pills by their color or form and not by their therapeutic effect. Or, yet another example, when my daughter was four, she once – in the perfect empiricist fashion – grouped the philosophy books in my bookcase by *similarity* in terms of color: the red books, the green books, the blue books. Yet a more meaningful way of grouping them would have been by historical periods, or alphabetically, or by philosophical currents. But of course she could not be expected to use these *points of view* as a basis for abstraction since this would have *a priori* implied some *prior knowledge* of philosophical history and authors. The only basis for her to go by was her prior knowledge of *colors*. To proceed by *sense experience* as proposed by Locke meant for her to proceed in accordance with the level of knowledge of a four-year-old.

Thus, it's easy to see that while we can indeed abstract various features from a range of objects, the sensualist context does not enable us to establish the priority and validity of these features with respect to *function*. On the contrary, it becomes evident that *before* we can abstract anything from these objects, we need to understand which is the relevant, or critical, feature that is to be *isolated as the general feature*, and that *before* we abstract this *essential feature*, we need to be able to think some *ordering in terms of functional relevance* or *valence* (color of books versus philosophical relevance). Once we have understood this fact, the scales fall from our eyes and we realize that Locke's account of the abstraction process is just another case of the seemingly plausible empiricist *mechanism of self-deception*. Actually, abstraction is a process of logical progression that is guided by the *concept of function*, a closing-in, in a certain *respect*, on the general idea, a process for which the sensualist mode, i.e. the immediate selective perception of features that can be apprehended by the senses, is simply insufficient.

But there are two further inconsistencies hidden in Locke's and, subsequently, also Hume's method. One of these is the "process of omission" which Locke claims will lead to the target universal concept, the other one is the way "*similarity*" is supposed to be determined and delimited by the

sensualist approach alone. We'll start with the *process of omission* described by Locke. Here, the basic problem of EAN is that the features that are to be omitted, or serve to determine if there is any similarity at all among certain objects, are *tacitly* assumed as *given* while the question of how we are supposed to obtain these *features*, in the first place, isn't even raised. This is why EAN tends to *use examples that everybody knows* from childhood because with these, the trick can easily be brought off. If bone marrow, for instance, were used as an example, "common sense" would be hard put to find any self-evident specific features. Ernst Cassirer has very lucidly described this basic EAN problem:

"*What is to be understood by 'features' ["Merkmale"] themselves and how 'features' can be identified and delimited against each other at all: this question is not raised in the process*."[456] (my note; WW)

And he points out that what is decisive, on the contrary, is the way *features* are selected and *grouped*, or the definition of what is to be seen as a *feature* at all; which implies that what is seen as a *feature* that enables us to determine the similarity or non-similarity of objects needs to have been previously defined in a certain way. But this definition, in turn, is dependent on the specific "*guiding cognitive interest,*" that is, the *point of view* that guides the comparison and is, as such, entirely external to the sphere of *features*. Thus we can never assume any originally given "material," nor a fixed range of *given features* that just need to be "read off." For with this simple reading-off of what appears to be "*given*," a "*moment of naïve realism*" comes into play (Cassirer targets formal logic in this context, but the flaw in the abstraction process is the same) "*which from now on dominates and determines their entire construction*":

"*The 'origin' of the features themselves is not at issue: it's not for logic to answer for it but for the world of 'things,' or the given world of 'impressions'*." (loc. cit., p. 162)

It should be added that the process of omission would even create further calamities, for at any given moment one would have to answer the question which of the properties or features omitted should remain so and which *additional* properties one should now begin to omit, always assuming that one is dealing with isolated, particular objects which actually consist of millions of different features that could in turn fall victim to the mechanism of omission. So, I again have three white foodstuffs, milk, feta cheese and lemon ice cream, and now, with probably dozens of individual features already omitted, a *new point of view* suddenly comes to mind: protein content. Following the empiricist method, I could now reintroduce content in terms of sugar, mineral, starch, sodium etc. as a

[456] Ernst Cassirer, Zur Theorie des Begriffs, in: Ernst Cassirer, Erkenntnis, Begriff, Kultur, Hamburg (Meiner) 1993, p. 161f.

new series of abstractions and omit "whiteness." But even with color, there is no escaping the problem: there is creme, chalk, gray-white, yellow-white … the crux of the method becomes ever more evident!

In his discussion of the flawed abstraction process in "Substance and Function", Ernst Cassirer sought to show that actually, there is only one way to establish the link between the particular element that presents itself to the senses and the point of view, or *respect*, that guides our reasoning, namely the *concept of function*, which also ensures the adequacy of our grasping of this function that, again, can always only be grasped in the abstract and not by "*sensuous experience*." He argues:

"*… for we have seen that 'abstraction' remains aimless and unmeaning if it does not consider the elements from which it takes the concept to be from the first arranged and connected by a certain relation. (…) It is clear that the mere sensuous experiences, however much we heap them up and however much we complicate them, can never suffice for this purpose. For sensuous experience is concerned exclusively with a particular object or with a plurality of such objects; no summation of individual cases can ever produce the specific unity which is* meant *in the concept. (…) For attention only separates or collects elements already given in perception; it can give these elements no new meaning and invest them with no new logical function.*"[457]

This very clearly reveals the logical flaw in Locke's theory of abstraction. Even J.J. Jenkins has to admit that the empiricist mode of abstraction by *similarity*, *selective attention* and *omission* as presented by Locke will, if at all, function or seem to function only with the most primitive relations (and not even with these, as I hope to have shown by now) but will fail as soon as functionally more complex connections are involved:

"*The same may be true of tables, chairs and doors, even though the resemblance involved now is a little more complex. But obviously some of the universals that we employ are more complex still, and, more importantly, not a matter of initially noticing resemblances and constructing universals on the basis of them. Rather, they are determined by the kind of interests we have and the kind of functions we may care to assign to things. On this level, the resemblance is dictated by the interest or the function assigned, and it would not be possible to notice the resemblance prior to knowing what the interest or function was.*" And he adds: "*It goes without saying that many universals will be of this kind.*"[458]

Aside from the fact that, here, the concept of *function* does come into play and that "*interest*" might represent what Cassirer calls a *point of view* and Descartes calls *respect*, this clearly shows that Locke's method of abstraction is inadequate as soon as it is applied to somewhat more com-

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457 Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, p. 24.

458 John J. Jenkins, Understanding Locke, Edinburgh University Press, Edinburgh 1983, p. 174.

plex objects and connections, and that abstraction here is more or less achieved by subreption and by seemingly plausible explanations such as "*noticing resemblances*," "*omitting features*," etc. Actually, what guides the abstraction work is the conceptually grasped *function* of the object and the *respect* involved. But how do we determine the *function*? Both Jenkins and Locke fail to address the issue, for the function can always only be *thought* and never by grasped by *sense experience*! Yet Jenkins clearly refers to *function* and *interest*. Suddenly, Hegel's short essay "Who thinks abstractly?" quoted above, comes to mind again, i.e. his statement that the *perspective* may vary according to the "interest," or point of view, of the individual observer. Thus, it is the *perspective* that determines the orientation of the *abstraction work*, and this perspective can "only" ever be thought and never be seen.

What remains to be discussed now is a last fundamental error in Locke, that is, his concept of *similarity* with respect to *individual*, *particular* objects from which we are supposed to read off an *immutable universal*, such as, for instance, circular, similar, dissimilar. Ernst Cassirer has highlighted this fallacy when discussing the mode of abstraction in the context of series and the concept of function:

"*While the empiristic doctrine regards the 'similarity' of certain contents of presentation as a self-evident psychological fact which it applies in explaining the formation of concepts, it is justly pointed out in opposition that the similarity of certain elements can only be spoken of significantly when a certain 'point of view' has been established from which the elements can be designated as like or unlike. This identity of reference, of point of view, under which comparison takes place, is, however, something distinctive and new as regards the compared contents themselves. … The content of the concept cannot be dissolved into the elements of its extension, because the two do not lie on the on the same plane but belong in principal to different dimensions*."[459]

Again, Cassirer advances our understanding by a significant step. We have already seen that the abstraction work is oriented to and determined by the *point of view* from which the elements are to be organized and compared. The crucial thought now is: this point of view is "*something distinctive and new as regards the compared contents themselves*"! This means two things: firstly, we are not dealing with a relation between two elements as in a mathematical function *à la* Frege like y = x2 – 4x, where there is a simple, single-value assignment. Rather, the *point of view* that determines the similarity and, thus, the assignment pattern may change and become something entirely new. It is an essential element of all creative scientific work that the *point of view*, the *perspective*, the context, the framework, the paradigm may change and that, as a consequence, assignments and the

[459] Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, p. 25f.

orientation of the abstraction may turn out to be completely different. What is decisive, therefore, is the change in the *point of view*, the change in *perspective* (both terms are obviously once more taken from the realm of the visual turn!) that alone will trigger the leap, the creation of novelty, the *synthesis*!

So what does this imply for the above concept of *similarity* and the associated concept of *equality*? For from an empirical point of view, individual particular empirical objects can never be really equal, and so *similarity*, too, is at issue since in this case it would amount to nothing but a subjective decision about grades of what someone sees as similar, just as some may feel that the daughter resembles the mother (in a certain *respect*) while others do not. Once we have defined a thing, e.g. a circle, we have also defined the ideational "fixed point" and can establish the *similarity* of a range of round objects by the degree to which they differ from the *perfect circle*, perhaps not with respect to color or quality but at least with respect to their "circularity." And once we have grasped and determined the *definition*, the *law*, the *rule*, speaking of *equal* or *unequal* also makes sense, for even if we know that empirical, drawn circles can never be completely identical, it is still justified to speak of *equal* circles in everyday life if, for instance, their radii are of equal length and the lines they are drawn with are equally thick. And this is something we are well familiar with when it comes to beer bottles, Brillo boxes and pictures of Marylin Monroe: we think of them as *equal*, *reproducible*, even though we know that only abstract entities can be completely equal, that is, identical. Again, Cassirer's *concept of function* shows the way:

"*For it is the relevance and the strength of the concept of function that there is no need for any 'similarity' to exist between the elements it connects and combines. What makes up its strength is, rather, that it assigns determinations which do not need to be otherwise connected than by this law of assignment itself, nor to show any 'similarity' or 'resemblance' whatsoever between each other.*"[460]

But now we need to ask what is the origin of the *equal* in itself, of *equality* as a universal, for equality can never be discovered empirically, can never be read off from things, and Locke's "process of omission" is obviously inadequate, as we have seen, just as a perfect circle will never result from our omitting more and more straight parts of the round line if we don't understand the definition of a perfect circle. This is clear. Nor have the more critically-minded modern EAN commentators we have quoted above failed to note these inconsistencies, and so this is the very point for us to raise the question of how to proceed, now that Locke's theory of

[460] Ernst Cassirer, Erkenntnistheorie nebst den Grenzfragen der Logik und Denkpsychologie, in: Ernst Cassirer, Aufsätze und kleine Schriften, Gesammelte Werke, Hamburger Ausgabe (Meiner), 2004, p. 51.

abstraction has proved to be evidently inconsistent and inadequate. It is also the point where the proponents of EAN, being obviously aware of the dead end, tend to launch their second strategy of counter-attack, rapidly followed by a rejection of the alternatives proposed by *rationalism*. Plato is rejected because of his mythical explanatory models, Descartes because of his reference to God as a guarantor, Kant because of the thing in itself; whereupon EAN philosophers resign themselves to returning to empiricism since, as they like to point out in this context, the doctrine may well be inconsistent but is still simpler, more realistic and more practice-oriented than that of rationalism. This is why most of them engage in a brief excursion into Plato's epistemology at this point of their argumentation, only to discard it as a fanciful, ancient, "*high-flown mythical position*"[461] and, then, praise the empiricist way as the only, if imperfect, alternative. Which induces me to follow suit and also go into Plato's epistemology here, albeit with the innovative intention of elaborating novel approaches to a solution in terms of modern *rationalistic Neo-Kantianism*. It may, after all, turn out that the rationalistic way of solving the problem is not only much more plausible and fact-based than the empiricist way but also, when all is said and done, more scientifically sound.

## Excursus: Plato's epistemology in the light of rationalistic Neo-Kantianism

As we have shown, building universal and abstract concepts from *sense experience alone* and without innate knowledge of some form is impossible. Plato not only realized the intricacies of the problem early on, he even attempted to offer a solution – within what was thinkable in his day. Plato paradigmatically addresses the problem of how we have acquired the concept of *similarity* in itself, or of *similar* and *dissimilar*, in *Phaedo,* one of the dialogues of his middle period. He starts discussing it by asking what it is that causes recollection of something *equal*, and then goes on to ask how we come to know "*beyond all these [equal things], the Equal itself.*"[462] Most importantly, he raises the question of the origin of abstract concepts:

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461 Cf. John J. Jenkins, Understanding Locke, Edinburgh University Press, Edinburgh 1983, p. 170; or John L. Mackie, Problems from Locke, Clarendon Press Oxford 1976, p. 125–128.

462 Quoted, in the following, from Plato, Phaedo, in Plato, Five Dialogues: Euthyphro, Apology, Crito, Meno, Phaedo, Indianapolis/Cambridge: Hackett Publishing Company 2002, p. 112–117; (74–78).

"*Whence have we acquired the knowledge of it? Is it not from the things we mentioned just now, from seeing sticks or stones or some other things that are equal we come to think of that other which is different from them?*"

He then raises the objection that any perception of *similarity* would appear to be subjective and relative:

"*Do not equal stones and sticks sometimes, while remaining the same, appear to one to be equal and to another to be unequal?*" This question having been answered in the affirmative, Socrates (Plato's "mouthpiece") goes on to ask: "*But what of the equals themselves? Have they ever appeared unequal to you, or Equality to be Inequality?*" Here the answer is no, of course, "*But it is definitely from the equal things, though they are different from that Equal, that you have derived and grasped the knowledge of equality?*"

The question of the *equal itself* and its *origin* and, thus, of abstraction becomes virulent: where does this concept of the *Equal in and of itself* come from, or the *perfect circle* in contrast to the never-perfect real circles? And so, by dialogue, he lets his interlocutor find his way:

"*Whenever someone, on seeing something, realizes that that which he now sees wants to be like some other reality but falls short and cannot be like that other since it is inferior, do we agree that the one who thinks that this must have prior knowledge of that to which he says it is like, but deficiently so?*" – and comes to the conclusion: "*We must then possess knowledge of the Equal before that time when we first saw the equal objects and realized that all these objects strive to be like the Equal but are deficient in this?*"

Thus, the result of this reflection, which is logical and generally understandable, is that the concept of the equal needs in some way to be *a priori* present in the consciousness *before* objects can be recognized as similar or dissimilar and, in further consequence, be classified as similar to the "archetype":

"*Then before we began to see or hear or otherwise perceive, we must have possessed knowledge of the Equal itself if we were about to refer our sense perceptions of equal objects to it, and realized that all of them were eager to be like it, ….*"

This step-by-step working out of the *a priori universal idea* at about 350 years before the Common Era is a cultural and intellectual achievement that is unique in its dimension and depth, and absolutely unparalleled in terms of intercultural comparison. Hermann Cohen comments on Plato's brilliant achievement in "Phaedo" as follows:

"*Has anybody ever seen the concept of equality when seeing equal stones? Thus, before we begin to see and hear and perceive the other, the knowledge of the equal in itself must have arisen in us from somewhere (…), of what it is if we were able to refer to it*

*with respect to the equalities that resulted from our perceptions … this is the birthplace of the a priori in the entire naivety of its power.*"[463]

EAN, in contrast, has not abandoned their attempts to "undermine" Plato even 2300 years later. Thus, the famous logician Ansgar Beckermann quotes the famous logician Günther Patzig who believes to have found a way to come to the *perfect*, *absolute concept* by small continuous steps of "approximation." Here's what he says:

"*It is, after all, an empirical fact that with respect to the examples quoted by Plato there is* a more *or* a less*: two things can be* more *or* less similar*, slightly more or slightly less beautiful, an action can be more or less fair.*"[464] (my emphases, WW)

This would of course be an interesting attempt to overcome Plato's doctrine by an empiricist approach, that is, by many small steps of approximation, if it weren't for a slight drawback, as will soon become apparent. For what is deployed now, rather than the abstract, perfect concept of the *equal* and the *unequal*, is the concept of the *perfect, abstract "more"* and the *perfect, abstract "less"*, which now have the burden of proof placed on them and whose perfect and universal nature would actually have to be ascertained, in the first place (and certainly not by reference to sense experience)! But thinking the *more* and the *less*, too, is only possible if there are two absolute poles that define their range. And so, as in Indian mythology, the earth rests on an elephant, and the elephant stands on a turtle, and then …! But the ingenious attempt continues:

"*And this suggests that we acquire these concepts by constructing an* ideal limit *of this progressive approximation. A series of pairs of empirical objects of diminishing* dissimilarity *provides us with the experiential basis of a progression the limit of which we define as* 'absolute equality'*. In order for us to be able to form the concept, no knowledge of a super-pair of objects that would be* absolutely equal *is required*."[465] (my emphases, WW)

Thus, empiricism seems to know concepts such as "*ideal limit*" and, most notably, "*absolute equal*" from experience (sense experience), and "*in order for us to be able to form the concept, no knowledge of a super-pair of objects that would be* absolutely equal *is required*." Now, that's interesting indeed: for the last sentence confirms what was discussed above, namely that the *absolute equal* is being defined although there is no way of knowing it since the idea of the equal (let alone the absolute equal!) cannot be ac-

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463 Hermann Cohen, Platons Ideenlehre und die Mathematik, HardPressPublishing Nachdruck (1877), p. 11.

464 Ansgar Beckermann, Das Leib-Seele Problem, Paderborn 2011, p. 26f.

465 Günther Patzig, Platon, p. 40; in: N. Hoerster (ed.) Klassiker des Philosophischen Denkens, Bd 1, München 1982; quoted from Ansgar Beckermann, Das Leib-Seele Problem, Paderborn 2011, p. 27.

quired through "*knowledge*," that is, from *sense experience*. On the contrary, the author even generously proposes to do without sense experience at all since he believes to be in possession of the smart procedure of obtaining the concept of the "*absolute equal*" – of which, however, we are supposed to have no knowledge *PRIOR* to its "*construction*" (the typical EAN *self-deception mechanism* in action!) – by means of the *perfect*, *absolute* concepts of the "*more*" and the "*less*," which in turn seem to have popped up from nowhere, and another novel *perfect* concept, i.e. the "*ideal limit*."

Let's now put this suggestion into empirical practice and see how the exponents of EAN would go about "*constructing*," for instance, *one* perfect circle – which, however, *is not yet known as a concept* – by using this approach, i.e. applying the "*more*" und the "*less*," as the fine phrase is. So, following the suggestion, what should happen is that deploying the "*more*" and the "*less*," we start moving points in the plane to form a circle line, the aim being to obtain, as the final result of the empiricist exercise, the *perfect* circle by approximation to the "*ideal limit*." Thus, we first move point x in a certain direction, then point y, always under the practical and empirical guidance of the more and the less, i.e. experience. But then, suddenly, it comes to our knowledge (for any *knowledge* is not necessarily in line with what leads to the perfect idea) that guided by the *more* and the *less*, we have at the same time moved point z in a somewhat wrong direction – but wait: there is no way for us to know which direction is *the right one* because we are not supposed to have any prior knowledge of the *perfect* circle, the final result, where the radii are "*absolutely equal*," all we are supposed to know is circles that we have seen, i.e. know from *sense experience*! And to make matters worse, an even more fatal insight begins to dawn upon us, namely that, from an entirely empirical-empiricist perspective, there is an *infinite number* of points for us to handle! As a result, it's safe to assume that the two grand logicians are still busy letting themselves be guided by the *more* and the *less*, moving one point after the other to practically-empirically approximate the perfect circle which they will never obtain this way! A single insight into the "*simple nature*," i.e. that a perfect circle simply means that all points in the plane must be always at an equal distance from the center, would seem to be a faster and sounder way of obtaining the concept than any attempt to obtain it by approximating the "ideal limit" of an object whose absolute, perfect value can never be known from sense experience. As ambitious as this attempt may be, it seems an unlikely means to disprove Plato's doctrine.

So far, therefore, Plato's conclusion is impeccable: perceiving things, we gain the insight that they are more or less equal but never reach perfect equality, *the equal in and of itself*, against which we always, if unconsciously, "measure" them. But where, Plato goes on to ask, do we get this *concept of the equal* if we obviously already need it to be at all able to compare

things, and since when do we have it? Well, obviously, as he had said before, we have it prior to our seeing and hearing, *prior* to perception. But how, since we are born seeing and hearing, is it possible for us to already have the *concept of similarity*, the *measure*, within ourselves, *at birth?* Up to this point, Plato's reasoning is again conclusive. And now we come to the point where Plato, about 350 before the Common Era, struggles for a rational answer. He has discovered something logically compelling and seeks, as any researcher would do, for the "strongest logos," the most plausible hypothesis to explain the phenomenon he discovered. He appears to have found it in the myth of the transmigration of souls, assuming that it is in the course of metempsychosis that the soul has always already seen the eternal, immutable idea of the equal, the number, or the circle. It is conceived of as potential knowledge that the soul has at birth but that is not concretely activated unless we perceive the respective particular things. The validity of the rationalistic explanation of *a priori* knowledge ultimately hinges on the correct answer to this question – hence its eminent importance. For both Plato and, enhancing his reasoning, Descartes and in some respect also Kant *a priori* assume the innateness, or at least existence, of the primary categories of thinking, even though Kant says so only in a rather roundabout way. At least as a *function*, the measure must exist *prior to* the measuring, it can never be read off from the objects to be measured. So, in the conflict between *empiricism* and *rationalism*, proving the existence of innate principles and ideas, of innate knowledge and innate faculties, has top priority!

The hypothesis that may have appeared most plausible to Plato certainly cannot satisfy us today unless one is New Age follower or believes in transmigration of souls. So, what other possibilities can we bring to bear from a latter-day scientific perspective that will enable us to plausibly explain the innateness of knowledge? Well, we have already quoted from Plato's Seventh Letter, namely his statement that the timeless ideas have their "*existence … in souls*,"[466] that is, in the consciousness. And we also know that the brain, the natural basis of thinking, kept developing in the course of evolution in response to the challenges and requirements of the natural environment as well as the communication among individuals, the social context. We have already seen that "*By evolution, we understand the progressive development of any system with a 'memory'*" (see fn. 102). We also know that what constitutes this "*memory*" is the fact that our hereditary material stores important experiences, i.e. "*knowledge*," and genetically transmits and enriches them in the course of evolution. Thus, there actually is something like a "migration" in nature, a transmission of important "information," which is a definite evolutionary advantage. At the level of,

[466] Plato, The Seventh Letter By Plato, Written 360 B.C.E., Translated by J. Harward (accessed at: http://classics.mit.edu/Plato/seventh_letter.html)

say, bacteria this may be "information" for enzyme production that helps to induce antibiotic resistance. In humans, genetic transmission and sophistication have worked to make the brain, the hand, the vocal tract develop in a specific way, but today we also know that the "number sense" is innate, at least for the numbers one, two and three, as well as our sense of probability, steep cliffs fear, the three-dimensionality of spatial vision and many other capacities of "vision," certain capacities of discrimination, e.g. among faces, so-called folk psychology, etc. Also, Noam Chomsky has shown that our *universal grammar* is innate. All this will be discussed in detail in the chapter on innate knowledge. For now, let's assume that simple basic concepts such as the capacity to think *similarity* and *dissimilarity* are dispositionally *innate*. If this is true, Plato's entire chain of reasoning suddenly becomes extremely strong, if not irrefutable. So, why not risk the attempt to rethink his epistemology from a latter-day point of view? Charles Darwin himself had already suggested this when he noted in his diary:

"*Plato (…) says in Phaedo that our 'necessary ideas' arise from the preexistence of the soul, are not derivable from experience. – read monkeys for preexistence –*"[467]

We thus see that Plato's logical chain of proof not only makes philosophical sense, it becomes definitely understandable, from the point of view of evolution, when the biological "memory" and epigenetics are taken into account. We have a basic cognitive structure of dispositional *functions*, directional capacities, which Plato, in his terminology, conceives of as the foundational, perfect ideas we have in our *soul*, that is, our consciousness. Only when he ventures to apply his groundbreaking idea to concrete objects, for instance to the idea of a bed – which he uses as an example in Chapter X of his *Republic* -, Plato overtaxes the explanatory potential of his brilliant discovery, and his reasoning becomes contestable. To my way of thinking, Descartes' formulation of the *simple natures* has provided this concept with a novel basis in *visual thinking* that allows us to see how these forms of rational thinking are applied in practice. The idea of a bed, in contrast, cannot "exist" independently because there can be nothing *innate* or *intuitively evident* about it as an entity. What can, however, be grasped by innate ideas are virtually all the *functional components* that enter into the construction of a bed. Every bed consists of *plane surfaces*, it is *one* but consists of *parts*, the parts are joined in certain *angles*, mostly *right* ones, there is a foot *end* and a head *end*, the *form* is *rectangular*, the *function* has gradually evolved from simpler *forms* of beds, so there is a lying *surface*, it is *soft* where the ground is *hard*, and so on. From which it

[467] Charles R. Darwin, Notebook M: Metaphysics on morals and speculations on expression (1838). CUL-DAR125. Transcribed by Kees Rookmaaker, edited by Paul Barrett. (Darwin Online, http://darwin-online.org.uk/); No. 128.

follows that while our understanding of the individual *simple natures* that make up the bed can indeed be based on innate capacities and dispositions, the reified "idea of the bed" as such cannot.

Narrowing down Plato's by then overworked doctrine of forms to the *simple natures*, Descartes *operationalizes* it and makes it universally applicable. We will extensively discuss these *simple natures*, for they are the methodical link between *innate knowledge*, *visual thinking* and the epistemological methodology of rationalism. Regrettably, due to the excessive concern with Descartes' *Meditations*, there are not many authors who have adequately understood and appreciated the key importance of *simple natures*. There is Noam Chomsky who has repeatedly suggested that it is definitely plausible to imply an evolutionary basis when interpreting Plato's and Descartes' grounding of man's cognitive capacities. And there is James McGilvray who, in the preface to the third edition of "*Cartesian Linguistics*," points out that this is indeed the only course open to us:

"*If much of the mental machinery needed to develop concepts and their combinatory principles is innate and one is going to try to explain how it comes to be in the mind at birth, it won't do to say that God put it there (Descartes) or to construct myths of reincarnation (Plato). The only course open to us is to look to biology and those natural sciences that can say what an infant human begins with at birth and how what s/he is born with develops. And taking that tack also makes it possible to at least begin to speak to the question of how human beings came to have apparently unique machinery in the first place – to address the issue of evolution.*"[468]

In summary, we can say that Plato's solution of the problem he discovered is essentially adequate but needs to be reworked in accordance with the modern insights of the sciences and the theory of evolution.

This being said, it is time for us to draw up a first summary regarding the potential of classical empiricism as initially formulated by Locke and radicalized by Hume:

1. The assertion distilled from Locke's one-man self-observation, i.e. that our ideas must invariably stem from experience, which should really be called *sense experience* only, is indefensible because neither the *function* of objects nor the *complex* ideas, let alone *ideas* that are *universal* and *abstract*, can be obtained this way.
2. The entire approach of Lockean empiricism, i.e. the *tabula rasa*, the *dark cabinet*, the *camera obscura* that are supposed to receive sensory perceptions like a projection screen in a completely *passive* way, is *not* in accordance with the actual nature of the perceptual processes and thought processes of the self-conscious mind, as well as diametrically opposed to today's state of knowledge in *vision science*.

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[468] James McGilvray, in: Noam Chomsky, Cartesian Linguistics, Cambridge University Press, Cambridge/New York 2009, p. 18.

3. The mind, initially described by Locke as completely empty, is nevertheless supposed to be, firstly, already active in some way in the empty cabinet; to contain, secondly, an *operative function*; and, thirdly, even to be able to *observe* its own operations – no commentator in the secondary literature has ever been able to make out what the role of these "operations of the mind" is supposed to be, let alone how "the mind" is supposed to be able to "observe" them.
4. The splitting-up of perception into *simple ideas* and *complex ideas* – with the latter being assembled without remainder from the further, like building bricks – does not stand up to scrutiny, as any detailed analysis will show, and the empiricist theory of assemblage clearly misses the purpose of adequately explaining and describing the *functions* and *relations* of things, people, and mental entities. The doctrine of *simple* and *complex ideas* is the congenital disease of empiricism and has been thoroughly analyzed, and shown to be indefensible, by Thomas Hill Green and other authors. This assessment is shared even by a majority of Anglo-American authors who, however, take great care to avoid a definitely negative pronouncement. Thus, the emperor is actually naked but all the servants at his court shy away from telling him the truth.
5. Locke's concept of "idea" is so vague and ambiguous, as most commentators have noted, that many statements of the "Essay" are at least inconsistent, if not plainly contradictory.
6. The direct, unmediated reception of simple ideas and the subsequent "switching through" to names and, what is more, universal concepts are obtained by subreption and can never work in the way this is described. Here, the vagueness of the concept of idea serves to mask the signature EAN mechanism of self-deception.
7. The emphatically empiricist approach of Books I and II of the "Essay" is in part plainly counteracted by the almost rationalistic tenor of *Book IV*.
8. The *abstraction* process proposed by Locke, and the way universal and abstract concepts are supposed to be obtained from pure sense experience, is completely impracticable and can, in the form described by Locke, never bridge the gap between the level of objects and properties that are always particular and individual, and the level of abstract entities. But while the Lockean mode of the abstraction process is impracticable, as discussed above, its intention is at least understandable, whereas the abstraction process proposed by Berkeley and Hume is a complete failure from the point of view of method, as we will see.

## Hume's failed attempt to "decapitate" western rationalism

While John Locke can be credited with the good faith effort of an upright 17th-century philosopher to create – albeit with insufficient means – a solid secular philosophical foundation for the sciences and society, David Hume strikes one as an extremely hard-to-assess maverick. Gilbert Ryle, one of EAN's "grand inquisitors," literally invoking the "*picture of Hume decapitating the Rationalists*", does not hesitate to qualify his empiricism as "*guillotine edged*" and even suggests that Hume probably "*also wanted to shock*" and may have been driven by something like *schadenfreude*.[469] But before engaging in a more detailed examination of the critical elements in Hume's thinking, let me offer some more general observations. Evaluations of Hume's philosophy range from the devastating critiques by his contemporaries Reid and Beattie to the appreciation, and methodical "overcoming," by Kant and the Kantians to his positive reception by thinkers in Germany – both critical of rationality[470] and, later, antirational (Nietzsche) – to his "*virtual canonization*"[471] by 20th-century positivism and analytic philosophy: to witness, Moritz Schlick's assertion, quoted above, that it was scarcely possible to go any farther. But there is also some harsh criticism, for instance by Bertrand Russell who, in his well-known essay "The Ancestry of Fascism," characterizes Hume as a crucial factor for the rise of fascism in Europe because he had undermined the building of reason: "*…; among all the successors of Hume, sanity has meant superficiality, and profundity has meant some degree of madness.*"[472] In his "History of Western Philosophy," Russell confirms his diagnosis: "*The growth of unreason throughout the nineteenth century and what has passed of the twentieth is a natural sequel to Hume's destruction of empiricism.*"[473] Many well-known commentaries refer to Hume's thirst for glory as a writer (which he himself mentions in his biography) as well as some other not quite above-board motives.[474]

Ernst Topitsch and Gerhard Streminger call to mind a well-known observation by Einstein in this context:

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469 Gilbert Ryle, Hume, in Gilbert Ryle, Collected Papers, London 1971, Vol. 1, 158–166.

470 Cf. Günter Gawlick/Lothar Kreimendahl, Hume in der deutschen Aufklärung, Stuttgart-Bad Cannstatt 1987.

471 Barry Stroud, Hume, Routledge London/New York 1990, p. 219.

472 Bertrand Russell, The Ancestry of Fascism (1935), in Bertrand Russell, A Fresh Look at Empiricism: 1927–42, ed. by John G. Slater with the assistance of Peter Köllner, London [u.a.]: Routledge, 1996; accessed on the Internet: http://s3586 16779.websitehome.co.uk/pdf/THE%20ANCESTRY%20OF%20FASCISM.pdf.

473 Bertrand Russell, History of Western Philosophy (1946), Routledge Classics 2004, p. 611.

474 See, e.g., J.A. Passmore, Hume's Intentions, Cambridge University Press 2013 (1952), who quotes authors such as T.H. Huxley, J.H. Randall jnr., p. 2f.

"*By his clear critique Hume did not only advance philosophy in a decisive way but also – though through no fault of his – created a danger for philosophy in that, following his critique, a fateful 'fear of metaphysics' arose which has come to be a malady of contemporary empiricistic philosophizing; this malady is the counterpart to that earlier philosophizing in the clouds, which thought it could neglect and dispense with what was given by the senses*."[475]

For many authors (among them Kant, who also refers to Hume's "destructive philosophy"[476]) Hume is one of the skeptics, and there are phases in his writings where he indeed aligns himself with this tradition. Mostly, however, he ostensibly affirms that while his sole aim is to promote the welfare of humanity, he simply can't see an alternative to skepticism. Now, while I feel that stylizing Hume as a spiritual ancestor of fascism is definitely going too far, I cannot absolve him from the charge of having quite deliberately, perhaps driven by a mixture of sophisticated intelligence, thirst of glory and a destructive-skeptical mindset, undermined society's confidence in reason and, thus, at least contributed to the rise of *irrationalism* in 19th- and 20th-century Europe. After all, he did pride himself on having reduced reason "*to nothing*," and was accordingly acclaimed by the enemies of enlightenment right up to Nietzsche and early fascism, as I have tried to show in my study in conceptual history, "*Das Irrationale*."[477] But if the hallmarks of Hume's philosophy are his vilification of the understanding and of reason, which he proposes to replace by *custom*, *sensation* and *propensity*, and his valorization of *instinct*; and if for him (not unlike George Berkeley), *belief* is the only way for us to relate to the things of the outside world – why, then, was this philosophy so attractive for positivism, in particular, why did it so strongly appeal to analytic philosophy and naturalism?

One reason for this would seem to be Hume's shrewd, if artificial, differentiation of thinking into "*relations of ideas*" and "*matters of fact*," which he probably borrowed from Leibniz. As it is, *matters of fact* has a convenient positivist ring to it, suggesting as it does, at least in this version, that these *facts* can be easily and *directly* accessed. We may be able to rely on logic when juggling with geometrical or mathematical formulae, but when it comes to relating to *real-world* facts such as the correct tilt angle of our roof or the last payment to our account, "belief" is our only resource. By suggesting that "*facts*" (whatever they are supposed to be in

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475 Ernst Topitsch / Gerhard Streminger, Hume, Darmstadt 1981, p. 44; Albert Einstein, Remarks on Bertrand Russell's Theory of Knowledge, in Paul Arthur Schilpp (ed.), The Philosophy of Bertrand Russell, La Salle, Illinois: Open Court, 4th ed. 1971, p. 289.

476 Immanuel Kant, *Prolegomena to Any Future Metaphysics,* Cambridge Texts in the History of Philosophy, Cambridge University Press 1997, 2004, p. 8, fn. *.

477 Wolfgang Wein, Das Irrationale, Frankfurt/M. 1997, p. 18ff.

themselves, without the forming intervention of the imagination or the understanding) can be simply copied in a sort of internal film of *impressionist perceptual images*, and by rigorously separating them, clinically clean, from any immanent structuring and conceptual cognition, Hume creates the *fiction* that there is a world of ephemeral external impressions, on the one hand, and, completely separate and isolated from it, the mental operations that take place in some kind of *instinctive* routine action and are supposed to somehow result from experience. For constructing this scenario, he relies on an extremely sophisticated and almost hypnotic language which tends to lure the well-meaning reader, unversed in Plato, Descartes, Kant or Hegel, into following his elaborations step by step and, eventually, falling for the whole concept.

And this is precisely what gets the goat of any reader who adheres to a philosophy of reason, for while you see the shell game being masterminded, line by line, in the wrong direction, you still follow the text with something like fascination and, at the same time, the rising resentment of one who is aware of being duped. Thus, while *Norman Kemp-Smith*, in his meticulous interpretation of Hume's Treatise, keeps offering observations such as: "*what makes this account of Hume so unsatisfactory…*," "*what makes this sentence so irritating…*" "*… is bewildering*" etc.,[478] and works out, page by page, Hume's ambiguities and inconsistencies, he still fails to fully expose Hume's moves. J. A. Passmore, in turn, refers to Selby-Bigge's *Introduction* to the *Enquiry,* commenting on Hume:

"*He says so many different things in so many different ways and different connexions, and with so much indifference to what he has said before, that it is very hard to say positively that he taught or did teach this or that particular doctrine.*" And Passmore himself argues: "*…we shall have to admit that his 'slips' are of gigantic proportions; and we shall be quite baffled by the way in which he not merely falls into, but goes out of his way to develop and extol, views quite incompatible with whatever systematic doctrine we care to ascribe to him.*"[479]

This diffuseness and inconsistency, this permanent switching between positions and perspectives makes it so much more difficult to criticize Hume with any degree of precision than it is to criticize Locke. Whenever Hume, in contrast, presents an dubious definition, one can be sure to find the phrase "*nothing but*"; whenever he introduces a particularly precarious thought, the sentence will start with "*It is evident that…*," "*It is certain that…*"; whenever he seeks to eliminate the ego or the ego function, he will use phrases such as: "*we find…*" or "*we observe…*," thus glossing over the methodical absence of the self-conscious "self"; and whenever his

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478 Norman Kemp Smith, The Philosophy of David Hume, Palgrave Macmillan 2005 (1941).

479 J.A. Passmore, Hume's Intentions, Cambridge University Press 2013 (1952), p. 2.

arguments need to be particularly suggestive or to distract from hidden problems, there will be phrases such as: "*Every one will readily allow*…." Thus verbs like, *find*, *observe*, *feel*, *notice*, *discover* invariably turn up when what is actually at issue is *thought processes*. But not unlike George Orwell's "*Newspeak*," Hume's ingenious use of language creates the illusion that thinking is "*nothing but*" (!) instinctive *feeling*, *noticing*, *discovering*, *finding* etc.

Gilbert Ryle, also provides an interesting example of this manipulative technique. Seeking to explain how Hume's masterpiece of *differentiating* between *facts* and *operations of reason* is supposed to make sense, he offers the following example:

"*In the strict sense of 'Reason', it is not in virtue of his Reason that the doctor diagnoses a fractured bone or the shepherd predicts the rising of the sun*."[480]

This argument is valuable in two respects, for if we were to show all the thought processes that are actually involved in the diagnosis of a fracture, we would run up quite a list: this is not just about the visual examination of an X-ray image in terms of *sense experience* as suggested by Hume's erroneous assumption that this is indeed a *fact*, a *matter of fact* – for a fracture, differentially diagnosed, may be caused by a bone disease, congenital or acquired, by the metastasis of a tumor, or by a malign myeloma and, in addition, any such diagnosis requires a comprehensive understanding of X-ray projections, of the patient's age, of ways to exclude technical artifacts, and many more such considerations. The simple "fact" of the diagnosis turns out to be the final result of a complex visual and conceptual thought process. A radiological diagnosis implies comprehensive diagnostic and logical *perspectives* that include a multitude of insights and reflections.

Having studied Hume's writings for many years, as well as a considerable amount of secondary literature, I believe that his real intention and strategy is most clearly, and almost better than in all his other writings, set forth in his *Abstract*, which he wrote as an advertisement for his work. There, referring to Bacon, Locke, Hutcheson, among others, he first states that he adheres to the line of thought that claims to be entirely based on *experience* (as usual without specifying what "experience" actually means). He then sets forth his theory of *ideas*, concluding "*that we can never think of any thing, which we have not seen without us, or felt in our own minds.*" This means that all thinking – and he consistently refers to *ideas* – and all thoughts are reduced to, or dependent on, *sense experiences* of the outside world, with the implicit assumption that the impressions of the outside world have conveniently already connected of their own ac-

[480] Gilbert Ryle, Hume, in Gilbert Ryle, Collected Papers, London 1971, Vol. 1, 158–166 (p. 161f.).

cord to form *any thing*. He then explicitly refers to Malebranche who "*would find himself at a loss to point out any thought of mind, which did not represent something antecedently felt by either internally, or by means of external senses, and must allow, that however we may compound, and mix, and augment, and diminish our ideas, they are all derived from these sources.*" This is the crucial strategic thought, clearly and distinctly stated: all our thinking is limited to the "administration," or associative transformation, of that stock of "ideas" that have found their way, by internal or external perception, i.e. *sense experience*, into our mind. And these "*ideas*" are consistently described, in the *Treatise* as well as the *Enquiry*, as *images*, that is, as *copies* of the *impressions* perceived. So, this is not about ideas as conceived of by Plato or Descartes, nor even about *simple* and *complex ideas* as in Locke, but about *images*! However, in the above sentence, he makes an inconspicuous but extremely momentous mistake, for he speaks of "any *thought* of mind" and, thus, of *thoughts*![481] And this, precisely, is the crucial point, for our thinking does not merely consist of *images* – copies – of the objects of our environment that are taken from our field of view, we also have any amount of other *thoughts* of a most diverse nature and do not just assemble copied images in the manner of a building block system. This is also the reason why his entire theory of universal and abstract ideas collapses, for these ideas can of course not be perceived or felt by the senses. But more on this later.

For all the above reasons I feel that there are only two ways to avoid walking into the skeptical "double trap" set by Hume. Kant came to understand this after a great deal of thought and, as a consequence, so completely rebuilt the whole stage of space, time and categories that Hume's sleights of hand no longer worked; which, however, also meant that he committed himself completely to this rebuilt stage. I believe that there are other ways of coping with Hume, e.g. by exposing his sleights by closely controlling them: *firstly*, the completely flawed *theory of perception* and, *secondly*, the no less flawed treatment of *universal* and *abstract ideas*, two flaws that would also correspond to two of the three flaws found in Locke, as discussed above. Regarding the *third* point, innate knowledge, Hume defies debate of whatever kind because for him, thinking is something like an *instinct* which works the same way as our sensations and customs do, that is, more or less automatically, and is of course innate since this is what instincts are. But by depriving thinking of its universal and necessary nature and degrading it to a mere instinct, there is no need for him at all to engage in a debate about "innate ideas and principles," for the universal and necessary nature of reason has, anyway, been already

[481] David Hume, Abstract of a book lately published; published in: An Enquiry Concerning Human Understanding, Ed. Eric Steinberg, Hackett Publishing Company, Indianapolis 1993, p. 128.

destroyed. In the following, my concern in the present context will be only with those two aspects in Hume that have already been touched upon in my criticism of Locke:

1. How is the *perceptual process* as proposed by Hume (and largely borrowed from Locke) supposed to take place in reality? And what are the main flaws that account for the failure of all further theses, and especially the fundamental theses of empiricism, to function in conformity with the system?
2. How will Hume manage to obtain *fixed* and, what is more, *universal* and *abstract concepts* from the *fluctuating impressions* of the outside world or, in other words, how will he go about explaining and justifying their origin and logical "existence"? The issue, then, is his *theory* (largely borrowed from Berkeley) *of abstraction* and *abstract ideas*.

Basically, Hume's strategy is to radically eliminate the last rational and structuring elements from Locke's – already flawed – perceptual model and to reduce the perceptual process to something like an *internal film* that proceeds without the guidance of reason; which results in a model of consciousness as a film that consists of a succession of flickering impressions, "images," not unlike a *stage* where snippets of thoughts and emotions that come from the "inside" enter and exit like actors in a play. In addition, somewhat later, the *self*, too, is eliminated (the observing function cannot find itself, the torch does not see its own light and accepts the light but without a source). It should be noted in passing that far from being just an 18th-century error, this line of thought has lasted right into modern analytical philosophy, as evident in *A. J. Ayer* when he writes:

"*Our reasoning on this point, as on so many others is in conformity with Hume's. He, too, rejected the notion of a substantive ego on the ground that no such entity was observable…*"

and goes on to specify his modern stance as follows:

"*What we hold is that the self is reducible to sense-experiences, in the sense that to say anything about the self is always to say something about sense-experiences; …*"[482]

Again, it is the *sense experiences* raining down on the *passive* and *empty plate* that are supposed to describe the ego – this is all we are allowed to know when we ask: "Where do all my sense experiences coalesce, who guarantees the continuity of my thoughts? Who is it that prevails in a discussion with others?" And the answer is: a *bundle of sense experiences*. By this one-dimensional focus on *sense experiences alone* Hume creates a

[482] A.J. Ayer ([1946] 1952), Language, Truth and Logic. New York: Dover Publications, p. 126

*world of images* where all elements of reason (categories), of the synthesizing ego and its logical function, have been eliminated while structures and functions, conveniently forgotten, are reconnected by his concept of *association* in new but qualitatively entirely different ways. Instead of the *necessity*, *logic*, and *structure* that characterize the connections among objects and the order of the method, there is *custom*, *acquaintance*, *propensity*, *resemblance*, *association*, *sensation*, that is, relations that are indeterminate and diffuse rather than clear and necessary. Thus, a first step has been taken towards the watering-down of reason, or from the clear and the distinct towards the diffuse and the unclear; the "floodgates" to skepticism have been opened.

At the same time, Hume adopts Berkeley's flawed abstraction process (Berkeley, being a skeptic, was an important role model, as Hume himself admits[483]) by clearing the concept of its *universality*, that is, its inherent *logical-systematic* nature, its *function*, and replacing it by the faded copies of the fluctuating images. He then applies the same procedure to *abstract* concepts, which means that even before he begins to do his conjuring tricks, the requisites he needs for his sleights of hand have been meticulously cleared of virtually everything that is regular, systematic, necessary, compelling; of, literally, any trace of reason. So, with all obstacles removed, he can now start operating with this defenseless, de-brained consciousness that consists of nothing but *separate washed-out copies-images* that follow each other in a *continual flow of impressions*. The stage being thus set, his main moves, such as his famous "fork," the destruction of causality, space and time and the introduction of *belief*, *instinct*, *propensity* will now seem quite plausible and, to crown it all, he will amaze his public by spiriting away the essential, unifying function of the consciousness that we are accustomed, from time immemorial, to denote by the word "I." This, then, are the general lines of his skeptical strategy whose main thrust, in my view, was intended to hit religion but took in its sweep *rationalism* and any *philosophy of reason*, as well.

From a perspective of *method,* however, some further reflections suggest themselves. As noted before, Hume claims – as John Locke had claimed before him – to start out from *experiment* and *observation* alone, but what we find is primarily, or actually exclusively, a form of *one-man self-observation*. But even this is basically just something of an act. A.H. Basson notes:

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[483] David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, p. 116 (Section 12, Part 1, fn. 32). Here, Hume is honest enough to point out that he borrowed the concept of abstraction from Berkeley. In the *Treatise*, I could find no such note.

"*But if we read Hume's works, we do not find any account of 'careful and exact experiments', nor do we find any 'cautious observations of men's behaviour'. There is something that Hume calls 'an experiment', but this is a procedure all his own, and it is invariably introspective in character. … Thus it looks as if Hume is bound to establish the limits of the human understanding by a process of cautious generalization from a large number of individual observations and experiments. … But the arguments he actually uses do not follow this simple pattern.*"[484]

This means that the basis of his empirical "observations" is his own consciousness, but Hume neither concretely refers to the experiments he invokes, nor actually validates them in any way, nor presents possible findings, and even where he generalizes from them fails to follow the patterns he describes.

Fundamental methodological problems also arise from the fact that in his early work, the "*Treatise of Human Nature*," Hume is more detailed in many critical points, and more willing to include arguments and examples, than he is in "*An Enquiry concerning Human Understanding,*" the reworked and redacted version of his philosophy. The latter provided an opportunity for him to eliminate certain problematic topics that might have provided a target for criticism (thus, his discussion of *abstract ideas*, to which he devoted an entire chapter in the *Treatise*, is now suspiciously short), and to backpedal on some points which before were absolutely "*certain*" and "*evident*." Among the latter, there is, for instance, his evaluation of *geometry*. Having before shrugged it off as "*imperfect*" and "*fallible*" due to its visual-practical component – "*because its original and fundamental principles are deriv'd merely from appearances …*"[485] – he now concedes that it is an "*infallible*" science along with algebra and arithmetic. Ultimately, however, he seems to have convinced himself (so it *was* "certain" after all) that geometrical ideas should be defined as ideal and are not dependent on or affected by their being executed with pencil, ruler and compass.[486] This is a serious reverse for Hume, for it implies that *geometry*, i.e. ideal, projecting, *applied visual* thinking, can no longer be abstracted from sense experiences but is part of the visual world of the "interior film" which, however, is *universal and necessary by its very nature*. Kant later famously clarified this by stating:

"*Geometry is a science that determines the properties of space synthetically and yet* a priori*. … this intuition must be encountered in us* a priori*, i.e., prior to all perception*

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484 A.H. Basson, A Pelican Book, Penguin Books 1958, p. 19, 25.

485 David Hume, A Treatise of Human Nature, Oxford University Press 2007, Vol. 1, Part 3, Section 1, p. 51.

486 David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, Section 4, Part 1, p. 24.

*of an object, thus it must be pure, not empirical intuition. For geometrical propositions are all apodictic, i.e., combined with consciousness of their necessity;…*"[487]

On the whole, the English empiricists, that is, Locke, Berkeley and Hume, were obviously not only not very well versed in mathematics but almost hostile to the mathematical sciences as such, and primarily to *geometry* because the latter is a domain *par excellence* of pure reason, located in the world of *sense experiences* and yet bound to obtain *certain* results, as even Hume must admit. Actually, the very fact *that* human beings *are capable of this type of thinking* calls into question the entire discourse of thinking as propensity, association and belief. Since empiricists will start out from sense experience alone, which they take to be principally and, according to Hume, even temporally prior to ideas, and since, therefore, they are systemically handicapped when it comes to abstract concepts and any intellectual achievements that are either *not visible* or not reducible to anything *visible*, they cannot but essentially question the certainty and necessity of geometry because the latter can obtain irrefutable results by logical thinking alone, results that – unlike the red ball, the blue bottle or Jones' green necktie – are no longer directly deducible from the "simple ideas" of sense experience. Considering the crucial role of geometry as well as mathematics for technology, architecture, the natural sciences, space travel, road engineering and the economy, it doesn't take much to see the absurdity of the empiricist attitude towards mathematics and geometry. Berkeley, in particular, who was so highly appreciated by Hume because of his skeptical interventions, was massively opposed to mathematics and algebra, an aspect of empiricism that EAN publications tend to treat rather "low key". Thus, Berkeley states:

"*…; hence we may see how entirely the science of numbers is subordinate to practice, and how jejune and trifling it becomes when considered as a matter of mere speculation. … However, since there may be some who, deluded by the specious show of discovering abstracted verities, waste their time in arithmetical theorems and problems which have not any use, it will not be amiss if we more fully consider and expose the vanity of that pretence; …*"[488]

In his book "*Hume – precursor of modern empiricism*," Farhang Zabeeh highlights the completely opposite stand taken by rationalistic philosophers:

"*Finally, this general attitude of hostility toward the demonstrative sciences may also be explained by recalling that most empiricists did not have a thorough knowledge of*

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[487] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 176. / B 40, 41.

[488] George Berkeley, A Treatise Concerning the Principles of Human Knowledge, Dover Philosophical Classics 2004, p. 103.

*mathematics, whereas their opponents had a better understanding of the demonstrative sciences.*"[489]

Zabeeh's commentary is very much to the point, if somewhat understated, for two of the greatest geniuses of all times, Descartes and Leibniz, not only "*had a better understanding of the demonstrative sciences*" but were light years ahead, in the field of mathematics, of the empiricist philosophers of their time. Quoting from Hume's "History of England," Zabeeh also notes that Hume, although a great admirer of Newton, was critical of the theoretical achievements of physics because he very strongly felt that there would never be a way for us to access the "inner nature" of things since according to his method, the validity of statements could only ever be established by *sense experiences*:

"*While Newton seemed to draw off the veil from some of the mysteries of nature, he showed at the same time the imperfections of the mechanical philosophy, and thereby restored her ultimate secrets to that obscurity in which they ever did and ever will remain.*"[490]

Now this is intriguing indeed, for in EAN, it is rationalism that has time and again be accused of seeking to hide reality from common-sense man behind a "*veil of ideas*" and to cut him off from the brain's direct access to things whereas, here, we can see for ourselves that the "shining light" of EAN philosophies was a committed *obscurantist* who not only believed, as mentioned, that we would never be able to find out why bread is nourishing but also that the laws of nature would always remain obscure to physicists.

There is a last interesting point I would like to highlight before taking a closer look at Hume's writings, namely that Hume wrote a chapter on *language* but, as far as I know, and contrary to Locke, never reflected in any detail on the function of concepts and the structure of language. Following the nominalist tradition, he takes words to be mere names but never accounts to himself for the deep structure of concepts, let alone grammar, because he believes to be able to consistently derive his entire philosophy from the internal flow of the images he observes in himself, his "internal film." In a very significant methodological clarification, the neo-Kantian *Alois Riehl* criticizes this basic flaw in Hume's nominalist idea of the *concept*:

"*Concepts* differ from sensations *in origin and must not be seen as notions that have been derived from the latter. … In the present botanical system, there is nothing that*

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489 Farhang Zabeeh, Hume – precursor of modern empiricism, Martinus Nijhof, The Hague 1960, p. 10.

490 Farhang Zabeeh, Hume – precursor of modern empiricism, Martinus Nijhof, The Hague 1960, p. 51.

*corresponds to the general image of a tree. The common feature of the images of various trees – that they have a trunk – has no conceptual or systematic value. Thus, the conceptual genus of natural objects differs from their general image. The concept of genus as such consists in the specific* rule, described in the definition, that allows us to recognize *certain empirical objects. This definition itself, however, consists* in the specification of the place in the system *of the knowledge pertaining to it, that is, as logical reasoning will tell us, in the specification of the* genus and the specific difference. … *Hume took the concept to be a qualitative rather than formal notion. He sought its origin in the quality rather than the form of conceiving it. He failed to grasp the nature of the concept, which therefore remains unaffected by his critique.*"[491]

This consideration is crucial for a better understanding of Hume's restricted approach. We will deal with it when discussing the famous and much-cited example, introduced by Hume himself, of the *missing shade of blue*. With respect to a criticism of Hume, the essential point here is that he always *tacitly* relies on the conceptual-syntactic instruments of language and on the systematics, orderings and relations embodied in them but, unlike Locke, never stops to think about the nature of the concept, preferring to deal with in a playful-skeptical way. For as Riehl notes in the above, a concept implies the *work of thinking* that is always already *crystallized* in it and is guided by a rule that is consistent with the understanding and determines the position, *never perceivable*, of this concept in a system of concepts, and the nature, *never visible*, of the concept or the thing denoted (that is, the *invariant structure* that is consistently present in all the objects covered by the concept), as well as the function, *never visible*, of the thing. Due to the shallowness of the nominalist understanding of concepts as mere *names*, Hume ignores all the work done by thinking, which is always already "built in" or crystalized in the concept, *but nevertheless implicitly relies on its function for his argumentation.* Richard Hönigswald has criticized this flawed understanding of the concept in empiricism, explaining the true relationship between the universal and individual:

"… *therefore the concept, too, being an expression of the same laws, must shed whatever remnants of the shadowy general picture of abstraction theory may still adhere to it. It is neither an indeterminate memory picture which, having been 'abstracted' from the experience of many cases, remains in the soul, nor is it the correlate of some occult 'essence' of things, mysteriously defined as both a trans-individual essence and an individual substance*. The concept combines absolute determinateness and unlimited plasticity in terms of function and performance. Rather than do violence, by its 'universality' and emptiness, to what is unique and individual, it determines it

[491] Alois Riehl, Der philosophische Kritizismus und seine Bedeutung für die positive Wissenschaft, Band 1, Geschichte und Methode des philosophischen Kritizismus, Reprint 2012 (1876), p. 30f. (my emphases, WW).

by virtue of its functional structure. *For uniqueness, too, always means being determined*."[492] (my emphasis, WW)

The individual is always determined by universal functions.

Relying on isolated passages of Hume's writings, Farhang Zabeeh has taken the trouble to propose a reconstruction of his non-formalized but implicit development of a linguistic principle of meaning and its application to sense experience. On the whole, however, there is no *consistent theory of proposition* to be found in Hume.[493] Some authors even present Hume as an intuitive precursor of analytic linguistic philosophy (see, for instance, Ayer's commentary, quoted above), but exactly *HOW* Hume is supposed to have achieved this feat in the absence of any theory of language and on the sole basis of *sense experiences* and *images* that are completely at odds with the assumptions of linguistic philosophy, on the one hand, and of concepts whose function and syntactic order he has never considered and which we are supposed to use by instinct and sheer *custom*, on the other, remains a mystery. A.H. Basson, for instance, writes:

"*His theory is that primarily the meaning of a word is an idea for which the word stands. … And this idea is a kind of image or picture of something which the world represents or means…*"[494]

So, the meaning of the word is linked to the fluctuating *images* of something, to a picture which, it is true, shows something in the outside world but can never explain its *function* and systemic position, the "*picture of something which the world represents or means*." Again, we are confronted with the empiricist *mechanism of self-deception* where the meaning is smuggled into the sense experience so it can, then, be simply copied and read off! Hume himself seeks to verify his empiricist method by taking words which he has stripped of their conceptual heart, or rather brain, and applying them to the copies, i.e. pictures, of the *sense experiences* and sensations which, but for the extirpated structure, he would not have been able to identify, in the first place. Thus, basically, the main trick of his method is that by *tacitly* capitalizing on the whole workings of the understanding that have always already been done and become *crystalized in the concept* and could never have been read off from sense experience alone, he enables himself to perform the sleight of hand of gaining insights by nothing but custom, sensation and association.

At this point, I'd like to briefly discuss an aspect of EAN which is particularly grotesque, and in principle just as ambivalent as EAN's bad

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492 Richard Hönigswald, Grundfragen der Erkenntnistheorie, Hamburg (Meiner) 1997, p. 227.

493 Farhang Zabeeh, Hume – precursor of modern empiricism, Martinus Nijhof, The Hague 1960, p. 105.

494 A.H. Basson, David Hume, Penguin books 1958, p. 30f.

Platonism of the "third world" or "third realm." For as we have seen, Hume, whom the positivists as well as Bertrand Russell, Ayer, Ryle and many exponents of analytic linguistic philosophy invoke as their "hero," clearly thinks in *images* and is next to nothing to do with *linguistic philosophy* at all. But on the other hand, language is the last retreat area for the abortive EAN positions. There is a particularly odd passage in Bertrand Russell that is revelatory of this contradictory nature of EAN. In his book "The Analysis of Mind," he describes the thesis proposed by the famous behaviorist John B. Watson that thinking is nothing but *internal sotto voce speaking* and *nothing to do with mental imagery*;[495] which means that we are suddenly confronted with two theories: on the one hand, Hume's doctrine of *images*, that is, the "internal film"; on the other, and in contrast to it, the *total rejection of images* in the doctrine of behaviorism which holds that thinking is internal *sotto voce* speaking and has long been associated with empiricism and positivism. In Russell's words:

"*Professor Watson, as a logical carrying-out of his behaviourist theory, denies altogether that there are any observable phenomena such as images are supposed to be. He replaces them all by faint sensations, and especially by pronunciation of words sotto voce. When we 'think' of a table say, as opposed to seeing it, what happens, according to him, is usually that we are making small movements of the throat and tongue such as would lead to our uttering the word 'table' if they were more pronounced.*" He then quotes Watson as saying: "'*I should throw out imagery altogether and attempt to show that all natural thought goes on in terms of sensory-motor processes in the larynx.*'"[496]

It is true that Russell does not fully subscribe to Watson's "larynx-and-whisper theory" and, by and large, sticks to *sense experience* and, thus, also to the *copy thesis* and the "internal film." Yet he will more than once refer to the idea of internal sotto voce speaking, which suggests that he may have hesitated to definitely shelve it. Of course, he cannot completely evade the behavioristic assumptions since behaviorism, in conjunction with positivism, was the prevailing psychological theory right into the

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495 For John B. Watson, all thinking is linked to physiologically observable activities which, in turn, are linked to the functionality of the larynx – a "pronunciation of words sotto voce." When reflecting on a difficult personal problem, the whole body is in turmoil, from a physiological perspective, "… *but your laryngeal mechanisms are setting the pace – they are dominant*." And even if one was to lose one's larynx, there would still be whispering: "*Removal of the larynx does destroy articulate speech but it does not destroy whispered speech*" (John B. Watson, Behaviorism, Norton & Comp. New York 1970). These theories, crude and even ridiculous as they may seem from a present-day perspective, nevertheless provide the basis not only for Bertrand Russell's changing views but also, and to a much larger extent, for Gilbert Ryle's "thinking."

496 Bertrand Russell, The Analysis of Mind, London: G. Allen & Unwin: New York: Macmillan 1922, p. 79f.

sixties of the past century. The dream of a materialistic world of behavioristically programmable robot humans may have been so powerful that no idea was too absurd for its proponents. Just imagine how a behaviorist would think of his mother or go about recognizing her: rather than visualize her face he would do soft vibrations with his larynx, and when the vibrations would become stronger, the word "mother" would finally slip out of his mouth even if he had not recognized her by her face at all. At any rate, the example readily shows what the world without mental imagery as propagated by the linguistic philosophers would look like, and yet there still are authors who seriously deny that there is such a thing as mental imagery![497]

Since in the present context, it is impossible for me to discuss all the flaws found in all of Hume's works in any detail, I propose to switch to Lothar Kreimendahl's critical and methodologically rigorous study, "*Humes verborgener Rationalismus*" (Hume's hidden rationalism), and to the conclusion he reaches at the end of his study:

"*Resuming the results of the above considerations concerning the premises, systematics, and compatibility of Hume's theses, and seeking to come to an evaluation of the stringency of his empiricist system, I can only conclude to the negative.*"[498]

In his study, Kreimendahl focuses on *four* basic elements in Hume's doctrine, which are also his main argumentative tools: firstly, his *epistemological framework* that leads to his destruction of the *concept of causality*; secondly, his "*principle*" (difference, discriminability, separability); thirdly, his "*possibility theory*" ("*Nothing is demonstrable, unless the contrary implies a contradiction. Nothing, that is distinctly conceivable, implies a contradiction*"); and, fourthly, "*Hume's fork*," that is, his clear-cut distinction between *facts* and *relations of ideas*. Kreimendahl continues his diagnosis:

"*Contradictions and inconsistencies can already be found in the epistemological grounding of Hume's empiricism. The subjectivist epistemology, largely adopted from Locke, cuts the ground from under his empiricist program, and the basic empiricist principle itself is in conflict, in specific ways for each of them, with the three other fundamental propositions.*"[499]

With those considerations in mind I'd now like to look first into Hume's theory of ideas and his theory of abstraction, thereafter.

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497 Cf. the debate between Stephen Kosslyn and Z.W. Pylyshyn in: Stephen M. Kosslyn, The Case for Mental Imagery, Oxford University Press, Oxford 2006.

498 Lothar Kreimendahl, Humes verborgener Rationalismus, de Gruyter, Berlin/New York 1982, p. 205.

499 Lothar Kreimendahl, Humes verborgener Rationalismus, de Gruyter, Berlin/New York 1982, p. 206.

## Hume's "Theory of Ideas"

Before discussing Hume's theory of perception, it is absolutely necessary to take a close look at his conceptual instruments and come to a real understanding of their function. Virtually all commentators of all epochs have dwelt on Hume's inconsistency, the lack of precision and coherence in the arguments and theses he puts forth, his inadvertent, if not careless, use of concepts. Barry Stroud puts this very clearly:

"*He never asks himself whether the theory of ideas is correct, and he never gives any arguments in support of it; he is interested in expounding only those details that he thinks will be useful to him later*."[500]

Hume of course pleads his "*privilege of a sceptic*"[501] in this respect. As it is, a certain diffuseness already results from the fact that unlike classical German philosophy, for instance, where there is a set of precisely defined instruments, English empiricist philosophy had to make do with instruments which, at least in the epoch in question, were still relatively vague and diffuse. As Thomas Hill Green notes:

"*…it is essential to bear in mind that Hume, so far as the usage of language would allow him, ignores all such differences in modes of consciousness as the Germans indicate by the distinction between 'Empfindung' and 'Vorstellung' and by that between 'Anschauung' and 'Begriff'; or, more properly, that he expressly merges them in a mode of consciousness for which, according to the most consistent account that can be gathered from him, the most natural term would be 'feeling.'*"[502]

In his introduction to Hume's work Theodor Lipps, the excellent German translator of the *Treatise*, has taken the trouble to offer a comprehensive explication, compiled with Teutonic thoroughness, of Hume's terminology, from which I propose to benefit for the following considerations.[503] Hume, as is well known, describes all the contents of the consciousness as *perceptions* and states that there are only two types he can find in himself, namely *impressions* and *ideas*. Cognition, thus, is based on *impressions*, i.e. *immediate sense experiences*, with *ideas* as their weaker *copies*. What is crucial here is that according to Hume, ideas are supposed to be the *exact*, if somewhat less vivid or "washed out," *copies* of these impressions and as such make up the *sole* content of our thinking. Actually, for Hume, *ideas* are nothing but the somewhat *faded copies of the impressions*, the images

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500 Barry Stroud, Hume, Routledge London/New York 1990, p. 17.

501 David Hume, A Treatise of Human Nature, Oxford University Press 2007, p. 400.

502 Thomas Hill Green, Introduction to Hume's Treatise of Human Nature, Works Vol. 1, Forgotten Books, London 2015 (1918), p. 196.

503 David Hume, Ein Traktat über die menschliche Natur, Hamburg 1989, Vol. I, p. 8f.

we receive "directly" (uncritically and such as they are in themselves). They are nothing whatsoever to do with the real concept of idea set forth by Plato, Descartes or Kant, as I'd like to point out right away as a precautionary measure. "*All ideas, especially abstract ones, are naturally faint and obscure*," Hume notes in the second chapter of his Enquiry, incidentally also providing an illustration of the sleights of hand in which he is so adept, for he has quite inconspicuously managed to slip *abstract ideas* into his definition although he has up to this point not explained which of the sense experiences, or images, that keep streaming in might yield a copy that is an *abstract concept* such as, for instance, generalization, value, or principle! We will later discuss Hume's abstruse theory of abstract concepts in more detail, but this already goes to show that the sleights of hand are at work from the very beginning. Even Theodor Lipps, the translator of the German edition, felt the need to put some order into the prevailing confusion:

"*But all these concepts always also have a second or third meaning. 'Perception', in Hume, is also the act of perceiving, 'impression' is also sensation = the act of sensing, idea is also representation = the act of representing. On the other hand, the object that becomes the content of the thought or the representation (…) is not distinguished from the object that is the content of the perception, sensation and representation.*"[504]

Coming from the German translator, this observation is highly significant since it pins down the fundamental lack of precision that can already be found in Locke but, in Hume, mutates from the inadvertent use of a pioneer into a systemic function of obfuscation. For we need to firmly insist that the different color hues of an impression (i.e. the image) are *sensations*, not thoughts. A thought, a reflection, may involve *ideas* (as defined by Hume), that is, pictorial elements, but it *is* not an image! Thus, one may concede that the mind retains ideas from the impressions or images it has taken in, but this mental copy is not really what we call a "*thought*." *Thoughts* are our means of projecting the *structural connections* into the images in our field of vision, we *think* the function of the object, which can never be seen, we *think* about social interactions and cultural influences, about business models, inheritance disputes and draft laws, all of which cannot be seen. But *ideas* in Hume's definition, i.e. mere *copies* of the images that impress themselves on the mind, are actually not thoughts at all but *raw, unstructured fields of perception*.

In contrast, Descartes, for instance, speaks of the two ideas of the sun that are present in his mind, one being the idea of the "sun" as perceived by the senses, the other the idea of the sun as represented in his geometrical-astronomical calculations. Considering its origin, the first

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[504] David Hume, Ein Traktat über die menschliche Natur, Hamburg 1989, Vol. I, p. 8f., fn. 8, (I./1).

form of idea corresponds roughly to the one described by Hume, although for Descartes, as well as for Kant, and in stark contrast to Hume's primitive copy of an image, or his inner film, even this sensory perception of the sun already implies an active thought process that integrates multiple relations of the perceived sun (light, color, number, changes in color, size, time of day, glare, change of location, the connection between changes of color, size, degree of heat, position, position relative to the horizon, etc.). In this respect, it is crucial not to let oneself be hoodwinked by Hume into taking his concept of *idea* to be more than just this: a quite simple copy of an image, with no workings of the understanding tacitly involved, for if there seems to be more to it, it is because Hume has already smuggled in additional meanings that are an integral part of the concept, thus incidentally providing the basis for the *mechanism of self-deception* that characterizes empiricism's myth of "experience."

At this point, most commentators engage in a heated debate about whether ideas can really always be *exact copies* of impressions ("*copy thesis*"), and whether alternating between impressions and ideas is possible, and how much "bleaching out" is supposed to occur between the impression and the copy (idea). As a side note, just imagine how razor-sharp and photographically exact all those images on the wanted posters would be if witnesses could *exactly* remember the suspects' faces and copy them from their impressions! Actually, however, the debate deflects from the much more important question already discussed above: are *all* our ideas, *all* our representations and thoughts – since these are used synonymously by Hume – exclusively *washed-out copies* of the *sense experiences* (images) we perceive? Isn't our mind continuously at work thinking up new things, filling the gaps in what we perceive, structuring and completing it in meaningful ways? *Principle*, *meaning*, *unity*, *law*, *rule*, *value*, *identity*, *necessity*, *totality*, *universality*, etc. – all these are *universal* and *abstract* concepts which Hume uses all the time and which can, as such and in principle, *never* be perceived by the senses. So, where are these thoughts supposed to reside? All these are crucial considerations that are more or less pushed into the background by the "copy debate." Hume essentially seeks to follow John Locke's epistemology in this, since the only way for ideas to be integrated into the workings of the mind is through copies from impressions. All these *sensations* – which, in Locke, are the impressions of sense experiences that emanate from the things and are *passively* received and which, in Hume, are called *impressions* – as well as the *ideas* that are copied from them are retained and are supposed, in conjunction with the emotions that originate from "within," to constitute the totality of the stuff that ideas are made of. As far as Hume is concerned, that's all there is in terms of the ingredients of our thinking.

In the same vein, Hume adopts Locke's division, unmodified, into *simple* and *complex ideas*, with *simple* ideas being *"such as admit of no distinction nor separation."*[505] These simple ideas are *de facto* the "atoms" of perception, that is, the smallest perceptible units that cannot be further analyzed and that are supposed to be the elements from which *complex ideas* are built. Little is said in the *Treatise*, and nothing at all in the *Enquiry*, about exactly how this is supposed to happen. Nor is there any concrete explanation of *how* and *where* to empirically locate these simple and complex ideas. For instance, regarding myself, I can always only find a complete *field of vision* but no simple or complex impressions that are transformed into ideas – what we have here seems to be just an alluring empiricists' *invention*, with nothing more to it. Hume himself presents only one concrete example in this context, namely an apple which, he claims, imposes itself to his self-perception as a combination of color, taste and smell. Thus, according to Hume, perceiving the biological apple implies letting oneself be guided by the sense experience of two or three *externally* perceptible properties and, then, abstracting the concept "apple" from them. But we have already shown with respect to Locke's example of the orange that what seems to be so straight forward is not simple at all. Edward Craig, it is true, argues with respect to simple and complex ideas: "*It is not difficult to approximately grasp this conceptual pair: what is simple cannot be further analyzed, so one can have a simple idea only when one has already had an exact impression*."[506] But in contrast to this rather harmonizing view, I believe that the concept is fraught with huge inconsistencies, if not the potential to compromise the whole construction of empiricism. Just as for the method of perception suggested in Locke's example of the orange – the multiple aporias of which I have discussed above –, the nature and *function* of an apple can never be adequately realized and understood this way. Apples and oranges. But what is much more crucial for Hume's epistemology is that on closer inspection, this mode of *simple* and *complex ideas* is completely at odds with the reception, in the mind, of *impressions* as images or "inner films" in the *copy-like* form of *ideas*. In this respect, there is a largely underrated but methodologically very significant difference between Hume's and Locke's concepts. Locke, too, sometimes refers to "*images*" but does so rather in relation to *memory* and *imagination*.[507] As discussed above, ideas in Locke tend to be something like individual perceptions, or combinations of individual perceptions, that are supposed to become conscious as propositions, that is, in a

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505 David Hume, A Treatise of Human Nature, Oxford University Press 2007, p. 7 (I./1).

506 Edward Craig, David Hume. Eine Einführung in seine Philosophie, Frankfurt/M. 1979, p. 45.

507 D.J. O'Connor, John Locke, Penguin Books, London 1952, p. 35.

*linguistic-conceptual* mode. In Hume, in contrast, ideas are quite clearly *images*, a term he uses time and again, which due to their successive flow and permanent presence must be conceived of as a kind of "*inner film*," arguably complemented by further sense experiences from hearing, feeling, smelling, tasting, that is, a synchronized film without subtitles – as described by Hume when discussing the existence of objects:

"*When I shut my eyes and think of my chamber, the ideas I form are exact representations of the impressions I felt; nor is there any circumstance of the one, which is not to be found in the other*."[508]

"*Ideas*," here, are nothing but the "*inner film*" of the perceptions that are reproduced such as they were in the field of vision. You close your eyes and watch the "film" of your room. What Hume calls "*ideas*" are *copied* "*representations of the impressions I felt*." This, of course, at once raises the question of how one is supposed to proceed from the images of the ideas on the "film" to the properties and functions of the objects, of how these can be analyzed into *simple ideas*, and of who or what it is that does this analyzing, and according to what patterns. Where, for instance, does one *simple idea* end and another – which may be hidden – begin in the image, and how are objects with specific properties and characteristics supposed to emerge from the "inner film"? Which leads to another problem that was already virulent in our discussion of Locke: if there is nothing but the tabula rasa, the empty plate, how is the flow of images supposed to be analyzed and interpreted when there is no innate, pre-structured agency capable of doing this? In the *Enquiry*, then, Hume speaks quite openly of instincts and images:

"*It seems also evident, that, when men follow this blind and powerful instinct of nature, they always suppose the very* images*, presented by the senses, to be the external objects, and never entertain any suspicion, that the one are nothing but representations of the other. This very table, which we see white, and which we feel hard, is believed to exist, independent of our perception, and to be something external to our mind, which perceives it. … But this universal and primary opinion of all men is soon destroyed by the slightest philosophy, which teaches us, that nothing can ever be present to the mind but an* image *or perception, and that the senses are only the inlets, through which these* images *are conveyed, without being able to produce any immediate intercourse between the mind and the object*."[509] (my emphases, WW)

There is nothing in this that lends itself as a starting point for linguistic philosophy. In contrast to Locke, where it was arguably still possible to at

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[508] David Hume, A Treatise of Human Nature, Oxford University Press 2007, Vol. 1, p. 8 (I./1).

[509] David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, p. 113f. (XII./1).

least retrospectively construct such a point – as, for example, in L. Krüger's rescue attempt –, Hume clearly describes thinking in *images* rather than propositions. Moreover, these images are *"conveyed"* by the senses! This is confirmed also by Edward Craig:

"*But here, Hume definitely goes beyond saying that these internal images happen to appear – for him, they are what makes up all our thinking.*"[510]

This flickering and rhapsodic flow of atomistic pixels, then, is the sole *basis* of the "experience" EAN likes to adorn itself with in every other sentence. In the heat of the debate, Hume refers to "*images*" three times in this passage of the *Enquiry* – *images*, not *simple* or *complex ideas*. This, however, is obviously not what he had promised in the exposition of the basics of his theory of ideas, for there he posits *impressions* and *ideas*, not fully composed *images*! And he will soon go on to also refer to *things* and *objects* without ever having defined *how* these objects are supposed to emerge from the *inner film*, how images are supposed to let us grasp the *properties* and *functions* of the things he subsequently also refers to! Furthermore, we again find the trademark view of empiricism "*that the senses are only the inlets, through which these* images *are conveyed*." Suffice it to say, at this point, that the individual impressions of a field of vision have magically become *images* and that these images have no less magically become *things*. The first magical sleight of hand seems to have worked, but one already suspects that there will be no way for *abstract* concepts such as principle, law, value, theory to be obtained from these flittering worlds of imagery.

On a side note, I'd like to emphasize right away that the *existence of external objects* is deeply problematic in Hume, denying as he does that there is "*any immediate intercourse between the mind and the object*". *Custom-based belief*, therefore, is the only possible form of relating to external objects, yet according to Hume's doctrine, there is no evidence that they really exist. This needs emphasizing at this point because up to now, all there is for us to rely on for the process of cognition is the inner film of *impressions* being dimmed down to ideas. But now Hume suddenly speaks of *objects*, things, without letting us know how objects and structures are supposed to emerge from the homogeneous, impressionist film of the field of vision, in the first place, with the additional complication that, actually, nothing definite can be said about the external world at all. Thus, firstly, there is nothing for us but to trust that the film represents the external world as it is in itself while at the same time, nothing – aside from the information we have reproduced on the "inner film" – can be said about the functions and structures of the objects of this world. But this,

[510] Edward Craig, David Hume. Eine Einführung in seine Philosophie, Frankfurt/M. 1979, p. 51.

then, means that *ideas/images* are incapable of providing this verification and that, moreover, we do not really know – even if this magical recognition of objects from images would somehow work – whether they are really accurate in reproducing the *real-world objects*! As for EAN that never fails to charge idealism and rationalism with hiding reality behind a *"veil of ideas"* and thus depriving man of his well-deserved palpable reality of things, even worse is to be feared, for Hume not only offers no other source of information about reality beyond his "inner film" but also fails to provide the organizing and structuring agency, i.e. understanding and reason, that characterizes rationalism. Therefore, Kreimendahl quite rightly notes:

"*Hume believed that there was no way to prove whether there are extra-mental objects that correspond to the impressions and the representations derived from them, nor whether the former resemble the latter*."

Due to the copy mechanism, however, this problem has its repercussions also at the "internal" level:

"*Ascertaining whether the impressions resemble the representations is a question of fact. But questions of fact can only be answered on the basis of experience. So, how are we to establish the resemblance or identity between the contents of two perceptions?*"[511]

Whatever the approach, a comparison is involved, and the "interface" between external film and internal "dimming down" is by definition unobservable since it would be the film of the film of the film, etc. In the present context, we cannot discuss this problem in any more detail, but even so it should be evident that this approach is methodologically as well as logically impracticable and doomed to fail. But let's also note, at this point, that in Hume, unlike naturalism and realism, there is no *direct grasping of things* and that there is no way at all to determine whether the process of copying impressions as ideas really produces reliable results; which makes one wonder, again and more than ever, what it is that accounts for Hume's popularity with EAN.

Still, a number of questions remain. For discussing them, I propose to rely on an additional source, i.e. the explications of the *Treatise* offered by Hume in the famous "*Abstract*" he wrote as an advertisement for his work. There his views are less veiled, and stated in no roundabout way:

"*When we feel a passion or emotion of any kind, or have the images of external objects conveyed by our senses; the perception of the mind is what he* (that is, the author, i.e.

[511] Lothar Kreimendahl, Humes verborgener Rationalismus, de Gruyter, Berlin/New York 1982, p. 33.

Hume; my clarification) *calls an impression, which is a word that he employs in a new sense*."[512]

This once more, and quite clearly, documents how external objects are surreptitiously obtained from an image of sense experiences, an image not composed of individual impressions as in an impressionist painting by, say, Seurat or Signac, but an image that has been *formed*. This is the very starting point for Kant to clarify that grasping, determining and differentiating objects in the *manifold* of our field of vision always requires the *synthesis* of the *imagination*, the *a priori* categories and the always already existing order of space and time, to bring structure and meaning into the impressionist chaos of sense experiences. Hume goes on to say:

"*When we reflect on a passion or an object, which is not present, this perception is an idea*." (loc. cit.)

Given a close reading, this sentence points to a really disconcerting dilemma. Thus, the images of the *inner film* streak past, and we are supposed to *know* nothing beyond these impressions, and yet the proposition suggests that we already have an *object* about which we reflect and which we are supposed to have extracted from the images *prior to* this reflection. As it is, the sentence is again an illustration of the *mechanism of self-deception.* Also, we have no idea of how we are supposed to be able to act at all in Hume's empiricism. For according to Hume, we are supposed to walk around with the film of directly recorded impressions in our minds but not *reflect* on them until *later*(!), since the copies of these impressions, i.e. the ideas, are not formed immediately but only in the course of *subsequent* reflection! Then, later, when we have fallen into the pit and have been eaten by the lion, the images of the impressions become *ideas*, but now it's not simple and complex *ideas*, far from it, for the senses have already at the level of impressions tacitly and kindly presented us with the *object*. Furthermore, Hume states that we "*reflect*." But if *ideas*, that is, the copies of the *impressions*, make up the entire content of our consciousness, who or what, then, is it that does this *reflection work*? *We*? Obviously, this reflecting agency needs to be in place *prior to* the incoming images, or else it would not be able at all to distill these images from the impressions. *Reflection* in this sense, however, seems to lack the function one commonly associates with it since the objects have already been kindly provided by the sense experiences. Reflection in this sense rather seems to be something like a copy shop where impressions are dimmed down to become accurately copied ideas. So, it is only after having been eaten by the lion

[512] David Hume, Abstract of a book lately published; published in: An Enquiry Concerning Human Understanding, Ed. Eric Steinberg, Hackett Publishing Company, Indianapolis 1993, p. 128.

that the Hume adept can, through reflection, start to form ideas from impressions. Not a particularly promising procedure, one should think. Let's proceed with Hume:

"*Impressions, therefore, are our lively and strong perceptions; ideas are the fainter and weaker. This distinction is evident; as evident as that between feeling and thinking.*" (loc. cit.)

This indeed confirms that the *post hoc* reflection, apart from producing the somewhat washed-out copies of the vivid impressions (images), has not resulted in any additional knowledge. And this, then, is supposed to make up the entire content of our thinking?

"*The first proposition he advances, is, that all our ideas, or weak perceptions, are derived from our impressions, or strong perceptions, and that we can never think of any thing which we have not seen without us, or felt in our own minds. This proposition seems to be equivalent to that which Mr. Locke has taken such pains to establish, viz. that no ideas are innate.*" (loc. cit.)

Now we do get an inkling why all these contrived and questionable constructions were needed, for they now leave the mind with nothing to rely on but the washed-out copies of the images that are supposed to make up its whole treasure trove, filling up the "empty cabinet".

Let's go one step further in our examination of the "*copy thesis*" postulated by Hume, that is, the assertion – presumed to be *evident* – that the impressions are "*exactly*" transformed into or, to use the customary expression, "copied" as ideas. It is important to note, however, that the copy thesis is postulated only for the copying of *simple impressions* as *simple ideas* even though, given the film-like form of the perception, it would seem more plausible to assume that objects and structures are "filmed" as whole *gestalts*, that is, *complex impressions*. For it is highly unlikely that my perception of an apple will start out from thousands of separate impressions of smell, taste and color rather than of the apple as an entity whose properties I will further determine by taking a bite out of it. But this leads to another significant dilemma because according to Hume, who uncritically follows Locke in this respect, *only simple impressions are copied*, but not *complex* ones! This means that the perception of a room as suggested by Hume, namely that he had first seen it and, then, copied the impressions, from memory, as ideas, could not happen that way at all, for in that case he would first have to break down the "films" of what he had seen into *separate impressions* – Locke's *simple ideas* – or, in Hume's words, "reflect" on them and then go on to copy them, through reflection, as *separate simple ideas*. The mode of "images" is simply incompatible with the doctrine of *simple* and *complex ideas*, for even when imagining one's own room, let alone the larger panorama of a town, there would be hundreds of thousands of simple pictorial elements that could function as

simple ideas. *Simple idea* or image – mixing the modes simply doesn't work! But this means that as early as on page five of his *magnum opus*, Hume's entire doctrine of *ideas* and *impressions* is actually revealed as impracticable, and collapses.

Kreimendahl highlights two further remarkable facts in the context of the copy thesis, namely the claim, suggested by the discourse of the "*exact copy*," that the copied ideas are *exact reproductions* of the external objects. But since in Hume, who follows Berkeley in this respect, the status of the objects of the external world remains open to doubt, this can only be assumed but never really ascertained, for Hume more and more "retracts" – in Kreimendahl's words – the connection to the external world and becomes more and more *solipsistic* as the development of his doctrine advances. So, what can arguably be assumed to be exact is the copying of the images recorded by the inner film into the pool of ideas. But whether this pool of ideas is capable of reproducing the *real things* with any exactness, if only superficially in terms of perspective, cannot be substantiated at all in Hume's system but is only *suggested* by the "exact copy" discourse. Stroud is aware of this, noting that Hume actually never explains the relation that is supposed to exist between the impressions and the objects:

"*In the particular case of seeing, tasting, hearing, etc., this is a precursor of what has come to be called the 'sensedatum theory' of perceiving… Hume gives little or no explicit argument for it, and none at all at the very beginning of the Treatise or the Enquiry, where it would seem to be most needed …he speaks of having objects presented to one's senses as if it were simply the same thing as having certain impressions*."[513]

Meanwhile, Hume himself, in some "unguarded moments," happens to forget his own concept and refers to external objects as if they were synonymous with perceptions. The second point, however, is even more questionable, for Hume assumes both a *temporal* succession and – due to the suggested *exactness of the copy* – a *causal*(!) *relation* between impressions and ideas, which is the very relation he *seeks to destroy*, a purpose that is at the heart of his entire oeuvre. Kreimendahl:

"*This means that even when establishing the first preliminary distinction* (between impression and idea, my note), *Hume needs to have recourse to the causal relation and, as a consequence, presuppose its validity. There is no indication that he was aware of this*."[514]

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513 Barry Stroud, Hume, Routledge London/New York 1990, p. 26f.

514 Lothar Kreimendahl, Humes verborgener Rationalismus, de Gruyter, Berlin/New York 1982, p. 27.

So, what we have here is another logical inconsistency in Hume's overall construction, which he might have become aware of if he had, for once, applied his skeptical capacities to his own doctrine. But such is the "privilege of a sceptic" that he may subvert whatever he chooses but never feel the need to account for his own theses.

This being said, the time has come to take a closer look at the famous debate about the perception of shades of blue. This objection was advanced by Hume himself, which does speak to his honor but has also led more than one author to suspect him of using it as a stratagem that enables him to impose his own "low-key" discussion of an embarrassing objection and, this done, shelve it without further ado. For Hume even included it in his *Enquiry*, which suggests that he wanted it at this point even in the ultimate version of his doctrine. In this example, Hume asks himself if a person who is shown a range of shades of blue with one shade missing, e.g. in the transition from the lighter to the darker shades, would be able to imagine, and correctly place, the missing shade without ever having seen it. If so, this would qualify as an example of an *idea* that was not copied from an external *impression* and would therefore counteract the dogma that *all* ideas have to be copies of external impressions. Hume dismisses the objection as inconsequential and negligible, and from the perspective of rationalism, it is primitive and of no interest because it only tangentially relates to the real problem, i.e. the role of thinking in perception. But it nevertheless raises a number of questions: if this is possible for one color shade, it would arguably be possible for all shades of all colors, and if it is possible for one type of sense-based perception it would be possible for all smells, tastes, sounds, etc. Edward Craig, too, highlights the weak spot and even extends the reasoning to include *gestalts*. Of course, it is possible to provide the missing part of an object, say, an octagon, without ever having seen the image of the whole thing. Craig concludes:

"*Suddenly, very little remains of the original principle. And this at the very beginning of the work!*"[515]

Of course, Craig at once seeks to reassure, explaining that this objection is not that important and that it can be shown, by reference to persons born blind, that the empiricist principle remains intact since a person born blind would not know any color shade. Aside from the fact that this argument is rather weak (see Antony Flew's critical comment in his book on Hume[516]), it ignores an essential point: if we are able to imagine and

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[515] Edward Craig, David Hume. Eine Einführung in seine Philosophie, Frankfurt/M. 1979, p. 46.

[516] Antony Flew, Hume's Philosophy of Belief, Routledge & Kegan Paul, London/New York 1961, p. 24ff.

place a color shade or an acoustic signal in accordance with the respective rules, this is because our understanding and the temporal and spatial *a priori* structure of our consciousness enable us to preconceive – or, rather, to have in mind as an implicit sideline – a *framework*, a *rule*, an *order*, a *scale*, musical or otherwise, where the shade of blue *logically* fits in (light blue, mid blue, dark blue, etc.). This is also, and even primarily, true for the perception of *gestalts*, quite rightly brought into play by Craig. Thus, by means of the *imagination* and within the framework of a scale, order, structure, musical scale, spatial organization that we *implicitly* have in mind or *implicitly* imagine, we are able to productively classify sensual perceptions. And with respect to *gestalts*, this goes even further, for when dealing with geometrical objects, for instance, we can add *auxiliary lines* at arbitrary points which were up to then unknown in the respective order, or think up novel figures as long as they make sense within the visual logic of the construction. But, then, the same must be true also for real-world applications, for example when planning a house or a financial deal. In this sense, each new real idea, each Aha! experience is a transgression, it is seeing with the mind's eye something that no human eye (including, of course, one's own) has seen before. From this it follows that such an auxiliary line is an idea, a hypothesis that is not based on any prior *impression*. It is "only" thought, constructed in an *a priori*-synthetic mode with no external film from which to copy! So, just a few pages into the *Enquiry*, Hume's doctrine collapses not only in the case of the shade of blue.

## From the unsound "Theory of Ideas" to woolly thinking

As a perceptual process, Hume's image-like, or film-like, world of ideas that are tied down, *qua* copy, to external impressions or internal impulses that in turn are supposed to be accurate reproductions of objects we are in principle unable to access has already become rather implausible. But this could be the very result Hume may have secretly had in mind. At any rate, the *material* that all our ideas are supposed to be made of has at least been circumscribed. The next step Hume now needs to take in his systematic destruction of reason is to eliminate the operations of the mind, as Locke called them, or replace them by a different mode of connecting the "material of ideas". To this end Hume, in Book 1, Part 1, Sect. 4 of his famous work, introduces the three *principles of association* which he claims are the sole operations of our mind that alone account for the *totality* (!) of our thought processes. This enables him to substitute *association* for everything that is habitually understood by "thinking"; and prompts us to take a closer look at what these three forms of association really imply.

The three operations of the mind that *alone*, according to Hume, account for all of our thinking are "*resemblance*, *contiguity in time or place*,

and *cause and effect*".[517] But for him, these associative operations of the mind are just "*a gentle force*" that works towards certain connections, a line our thinking tends to take, since otherwise they would suggest a stringent *necessity* which is precisely what the concept of association is supposed to help avoid. Incidentally, it is also quite evident that the three forms of association have their origin in Hume's image-based mode of thinking. *Resemblance* is illustrated e.g. by the bottles he sees on the table before him in his room, *contiguity in time or place* is exemplified by the chair that is placed close to the table, and *cause and effect* are repeatedly explained as visible by the example of the shock of two billiard balls. As such, the three forms of *association* and the examples offered by Hume are quite questionable and, unsurprisingly, tend to be buried in embarrassed silence by the commentators of the "charitable" commentators, with the exception of Edward Craig who takes the trouble to refute them one by one. Thus, Hume argues:

"*A picture naturally leads our thoughts to the original (resemblance): The mention of one apartment in a building naturally introduces an enquiry or discourse concerning the others (contiguity): And if we think of a wound, we can scarcely forbear reflecting on the pain which follows it (cause and effect).*"[518]

It is easy to see that association as presented in these examples can never be a simple substitute for logical and methodical thinking. A painting may indeed make one think of the person it represents, provided one knows her in the first place, but may also prompt a myriad of other thoughts. Actually, the result of association is, of course, always completely indeterminate. What is more, Hume conceives of association as an outcome of *custom*, so any association that presents itself at the very first encounter with a painting, e.g. a portrait, cannot be the type of association he has in mind at all, irrespective of whether it is the person in the portrait that is of interest or a person standing beside it. At any rate, it is little to do with thought processes! The example of the apartment in a building is so ridiculous, and the mode of *contiguity* in all this so utterly absurd, that I refuse to consider it at any length; here Craig has done what can be done in the detailed refutation drawn up for the use of his students. Nor will I further discuss the example of the wound, the sight of which is supposed to invariably make one associate the pain. If this were true, no trauma surgeon could ever get down to work because he/she would double up with pain every time he sees a casualty, so this again is sheer nonsense. So, the only

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517 David Hume, A Treatise of Human Nature, Oxford University Press 2007, Vol. I, p. 13f.

518 David Hume, Abstract of a book lately published; published in: An Enquiry Concerning Human Understanding, Ed. Eric Steinberg, Hackett Publishing Company, Indianapolis 1993, p. 14.

thing left worth discussing is causality (cause and effect) as it is supposed to work in the world of the thought-less "inner film". But in this respect, too, one gets the impression that what Hume has in mind is the shock of two billiard balls rather than any cause in a more abstract context such as, for example, the carelessness that was the cause of an accident.

So, what might a world of association look like in practice if we were to take Hume's inventions seriously? A judge would not rely on evidence for his verdict, and on the conclusions that impose themselves with necessity, but on associations, a "*soft power*" that will lead him in the one or the other direction, as the case may be, and may suggest a different association the next day. He sees the murder weapon, the dagger, thinks of Macbeth rather than the progression of events, and sentences the murderer's wife. Only someone who exclusively relies on *images* or an *inner film* rather than concepts, judgments and conclusions can come up with such an utterly preposterous description of the human faculty of thought and imagine it as consisting of "nothing but" *associations*. But if we enter into the situation of the *inner film* and imagine ourselves watching a silent movie, Hume's approach suddenly begins to make something like sense: if there are forms and colors that resemble each other, for instance, a big blueberry, dark and round, and a similar berry, also dark and round, right beside it (incidentally a deadly nightshade), we at once realize the resemblance and, so, should eat it – right? And if there is one thing close to the other, together in time and place, the fire pit close to the river, this obviously means that fire and water are connected by association – right? And if something always happens when something else also happens, lightning and thunder, for instance, then this is certainly not the same electrical charge that travels at the speed of light in the first case and at the speed of sound in the second but, as our sense experience tells us, two different things – right? There can be no doubt that Hume's doctrine has its origins in this film-like "world of thinking". Even Stroud, habitually so well-disposed, heaves a sigh:

"*It is difficult to believe that all the operations of the human mind take place only in accord with the principles that are so crudely exemplified here.*"[519]

All this of course leads to a host of consequential problems, only some of which can be addressed here. First of all, it is obvious that you cannot build logical thinking on the basis of associations since *associations* will always differ depending on the individual and the situation and will vary with the mood, the time of day, your wine intake, and the locality. As Edward Craig rightly notes, it lacks the element of *stringency*, *necessity*, *universality*. The associative popping-up of ideas is one thing, a mere jux-

[519] Barry Stroud, Hume, Routledge London/New York 1990, p. 37.

taposition without any internal connection. Craig, in an evident effort to gloss over Hume's incongruous reasoning, argues:

"*It would seem that Hume does not clearly distinguish between these two things; this may become understandable if we keep in mind that what he seeks to establish is a theory of thinking as 'inner perception'.*"[520]

Now this raises the question of whether Hume was really so naïve as to ignore this difference. Much more likely, he actually sought to destroy the necessity and universality of propositions in favor of a gut-based, woolly way of thinking, a *propensity* to think along the lines of custom. But Craig has noted another critical point in this context, namely that the three examples offered by Hume as an explanation of the mode of *association* do not describe the association between two *perceptions* that have *repeatedly* occurred together before the association suggests itself but the connection between *material objects* (such as persons in a painting and in real life, adjoining apartments in a building), a connection which he has not yet established, or is unwilling and unable to establish, at this point in time. While this is a blatant flaw, the way Craig tries to explain it is no less interesting:

"*Most likely, Hume made a common and, as such, probably hardly avoidable mistake, namely: to attribute to the impressions what actually belongs to the objects alone.*"[521]

Well, it's hard to be all at once an empiricist, a skeptic and a naïve realist, let alone achieve logical consistency in all this.

But let's take our discussion of *resemblance* a bit further and briefly recall what Descartes observed with respect to his ideas of the sun:

"*For example, there are two different ideas of the sun which I find within me. One of them, which is acquired as it were from the senses and which is a prime example of an idea which I reckon to come from an external source, makes the sun appear very small. The other idea is based on astronomical reasoning, that is, it is derived from certain notions which are innate in me (or else it is constructed by me in some other way), and this idea shows the sun to be several times larger than the earth. Obviously both these ideas cannot resemble the sun which exists outside me; and reason persuades me* that the idea which seems to have emanated most directly from the sun itself has in fact no resemblance to it at all."[522] (my emphasis, WW)

When it comes to contrasting the respective approaches of empiricism and rationalism, you can't be any clearer! Hume relies on *resemblance* as it

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520 Edward Craig, David Hume. Eine Einführung in seine Philosophie, Frankfurt/M. 1979, p. 58.

521 Edward Craig, David Hume. Eine Einführung in seine Philosophie, Frankfurt/M. 1979, p. 60f. (fn. 50).

522 René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 27;

is "acquired … from the senses" and claims that it provides us with all the images, or ideas, which – or parts of which – are, then, assembled according to the rules of his power of association. Descartes realizes that the insight that is more accurate and more convincing is in fact the one provided by the understanding and mathematics that has come to the conclusion that the sun is much larger than what our sense experience would suggest. He gains this insight by activating his innate reason, the *natural light*, and the findings of mathematics, geometry and astronomy that result from it. It logically follows that our sensory perception of an object may actually resemble this object to a *lesser* degree than the scientific insight provided by the understanding does, and that inversely the *resemblance* which, according to Hume, is one of the only three operations of our mind, is actually the *less reliable* one.

And there is still no end to the complications because, firstly, I cannot think *resemblance* at all unless I have an initial understanding of the relation of *similarity* and *dissimilarity* and, secondly, I am quite unable to determine which "line" of thinking I need to follow to observe resemblance unless I have a grasp of the invariant definition, the essence of the respective thing or concept. But in Hume, the association of *resemblance* is described as custom-based and building on the most obvious property, which strongly suggests its reliance on a very surface-oriented, purely optical basis, i.e. the inner film. Thus, if my only basis is Hume's associative world of images, I will say that the white pill that is a cardiovascular agent and the white pill that is a painkiller resemble each other because the most obvious association tells me that both are *white* and *round*. And yet, in terms of *function*, they are totally different, as different as the idea of the sun in our perception is from the idea of the sun in astronomy. But if I am unable to think in terms of the function-based relations and connections that are provided by our understanding, I am indeed thrown back on visual resemblance as my only reference point. Therefore, unless I am able to grasp the essential definition, the *nature*, the *function* of the object or the connection, all I have to go by is Hume's level of image-based association, and some purely exterior aspect, or some mood, custom, or emotion, is the only basis for me to establish a relation of resemblance. And since this is the very purpose Hume seeks to achieve by his transformation of thinking, his choice of strategy is so appropriate, for if one does not take the trouble to reason out the above points, one may well fall for his description. So I'll take this as an opportunity to highlight the disastrous effects the naïve psychology of association has had on the exponents of *analytic philosophy*. In his book "The Analysis of Mind," Bertrand Russell uses *relations of resemblance* to explain his sensualist conception of perception:

"*When different people see what they call the same table, they see things which are not exactly the same, owing to difference of point of view, but which are sufficiently alike to be described in the same words, so long as no great accuracy or minuteness is sought. These closely similar particulars are collected together by their similarity primarily and, more correctly, by the fact that they are related to each other approximately according to the laws of perspective and of reflection and diffraction of light.*"[523]

As an example, Russell again takes his favorite object, the by-now-familiar table. This panders to the empiricist *mechanism of self-deception* which would cease to work with observations of a less commonplace nature such as, for instance, a look through a microscope on bone-marrow. But it's precisely because self-deception would not work in that case that EAN proponents prefer to use examples that feature simple objects of everyday life, the red ball, the green necktie, the blue bottle, and, here, the table. Now in his example, Russell obviously uses relations of resemblance to explain how different individuals come to recognize and understand a table, but this resemblance is based on the *sensualist* level (*the inner film*!) of recognition alone. Russell speaks of the *perspective* from which they look at it, their *point of view* and the *reflection* and *diffraction of light* rather than the concept and specific *function* of a table that enables all observers to at once recognize it! If one sought to *understand* a blood smear on a microscope slide, for instance, one would indeed observe various cells whose perceived elements, such as color, form, structures are no doubt important factors, but one's main task would still be to understand their *nature* and their *function*, that is, derive it from, e.g., resembling structures, changes, patterns of coloring, the position of a cell with respect to others, its relation to the surrounding tissue, rather than from a *resemblance* of perspectives, angles of vision, and reflections and diffractions of light. Again, the essential difference between the surface-oriented *sensualist* EAN way of looking at things and the functional and conceptual way of *rationalism* becomes quite evident.

Hume's *resemblance*, associative, unreflecting and oriented to surface properties and sense experience as it is, always already tacitly draws on the thought processes described above, i.e. the *respect* that is constitutive of the resemblance and the grasping of an object's or connection's *essence*, or *invariant structure*, just as it tacitly uses the knowledge that is aggregated in the *concept* as well as an understanding of *similarity* and *dissimilarity* and, finally, of course, an understanding of the *function* of the *already familiar* objects of everyday life. Hume's second form of association – contiguity in space and time – is, as noted above, so utterly absurd from any viewpoint except that of a film-like perceptual psychology that I'd

[523] Bertrand Russell, The Analysis of Mind, London: G. Allen & Unwin: New York: Macmillan 1922, p. 52. (accessed at https://en.wikisource.org/wiki/The_Analysis_of_Mind/Lecture_V)

rather not discuss it at all, given that the only associations that come to my mind are of a more humoristic nature, such as the contiguity in space and time of the boss and his secretary, so… etc. The third form of association – *cause* and *effect* – has been addressed in so many works and discussions, for instance with respect to the textbook example of the billiard balls, that any in-depth discussion of it would go beyond the scope of the present book.

So let's return to Hume's mode of perception since it still raises problems that need to be addressed. For what has been tacitly eliminated by Hume are Locke's *operations of the mind* which, in Locke, acted as something like an introspective agency that monitored internal perception but were also charged with the function of assembling the *simple ideas* received from the external *sense experiences* into *complex ideas*. Locke had indeed realized that if he started out from a conception of consciousness as a *tabula rasa*, an *empty plate* or a *dark empty cabinet*, he needed a function – i.e. the *operations of the mind* – that was capable of assembling the *simple ideas* into *complex ideas* since otherwise no object construction would be possible, not even by his own mode of cognition. Now, in Hume, the outward impressions, or rather images, are called *impressions of sensations*, while the inward impressions are called *impressions of reflection*. The subtle difference, however, is that with Hume these inward *impressions* and *ideas*, the *impressions of reflection*, are only capable of providing feelings and emotions and that, as a consequence, the *understanding-like internal structure* that was still present in Locke, albeit in a rudimentary form, has been tacitly eliminated. Assembling *simple ideas* into *complex ideas* or, inversely, breaking down *complex ideas* into *simple ideas*, is now supposed to be the work of *association*, a "*soft power*," although Hume never explains in detail *how* this is supposed to work. For the *associations* one has will vary over time and with one's mood or situation and, thus, cannot guarantee the enduring existence of objects or structures that are necessarily built according to fixed patterns and functions. Insofar, Locke can at least be said to have tried, if unsuccessfully, to account for the process of cognition in a way that makes sense functionally, thus providing some sort of stepping-stone for Kant. Hume, in contrast, seems to be exclusively concerned with establishing a vague form of association where all structured thinking gets bogged down in an indeterminate associative world of *beliefs*, *emotions*, *subjectivity* and *propensity*; and, thus, created the ideal environment for the later rise of Nietzsche's *will to power*, because if "Nothing is true – everything is permitted".

But let's take a little step back in our endeavor to understand Hume's strategic intent and once more consider his thesis that all *ideas* are exclusively copies of the *impressions* that stream in by the gateway of the senses. We have shown that Hume has by now eliminated the internal *opera-*

*tions of the mind* that were still part of Locke's model and that, as a consequence, the only "faculty of thought" that is left is the "*soft power*" of his *three* forms of *association*. Now the only thing that remains for him to do is to ensure that what comes "from the outside," i.e. the *impressions* that stream in through the gateway of our sense organs, are really the only source for our mind to feed on for its forming of *ideas*. So, in terms of Hume's destruction project, this is what is left of our thinking once all *ideas* have been defined as nothing but *copies* of *impressions/images*:

1. The *impressions* our senses are supplied with by the things, but only as *raw sensations* since we have never structured or categorially synthesized or conceptually organized them, a stream of sense experiences, light reflections, shadows, splashes of color, pixels which are supposed to be subsequently copied as images into the consciousness.
2. The *ideas* as the fading, washed-out copies of these myriads of vague impressions and sensations.
3. All possible forms of composition or differentiation, by means of the *three* forms of *association* described above, among the washed-out copies of external *impressions* that have never attained, at whatever point of the stream of consciousness, the status of objects; and
4. *Feelings, impulses* and *emotions* that rise as *reflective impressions* from the depths of the soul.

So, a delighted Hume lifts his magician's cloak, pulls the rabbit out of the hat and, amidst the outcry of his amazed public, presents his reorganization of Locke's initial epistemology:

"*In short, all the materials of thinking are derived either from our outward or inward sentiment: The mixture and composition of these belongs alone to the mind and will. Or, to express myself in philosophical language, all our ideas or more feeble perceptions are copies of our impressions or more lively ones*."[524]

With this, the skeptic's ideal constellation is attained: all the material of thinking is derived from inward impulses or outward sensations, and thanks to the three powers of association, i.e. *resemblance*, *contiguity in time or place* and *cause and effect*, the copied and washed-out images are arranged in the form of an experimental film, as it were. This is the point in the *Treatise* where Hume marks the first triumph in his project of the "destruction of reason," and he at once offers an example to demonstrate the faultless working of his new method:

[524] David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, p. 14.

"*A virtuous horse we can conceive; because, from our own feeling, we can conceive virtue; and this we may unite to the figure and shape of a horse, which is an animal familiar to us.*"[525]

Hume's rather simple line of thought is easy to follow at this point: he has reduced all the content of the consciousness to ideas that are *copies of impressions*, so that's done. All he needs to do now is let himself be guided by the *soft power* of his *associations* and *instincts* and assemble these individual building blocks, moving in whatever direction his fancy takes him in the process: from his own feeling he *knows* (!) what virtue is – incidentally a vague feeling, as if Socrates had never struggled in vain to determine the concept of virtue, as if generations of ethicists had never tried, and failed, to define it; and from his *field of vision*, the image of a figure spontaneously emerges and forcefully, or by custom or drill ("Abrichtung"), suggests the concept of a horse – that is, the *name* of "horse," not the nature of a horse as aggregated in the concept; and now the soft power of *association* miraculously unites the *name* of the image of the object that has emerged from the field of vision with the name of the *feeling* that has come from the inside under the name of virtue – and hey presto, there's a virtuous horse.

This indeed warrants a closer look. Having explained impressions, ideas and associations, Hume introduces something entirely new in this example, namely an *object*, a horse. From his own inner feeling, he then draws a quality, *virtue* – which is actually a highly complex abstract concept that varies with cultures, epochs, and morals – and, by association, unites both representations, a four-legged animal and a highly complex concept. In this example, the horse is again invoked not as a concept but by its outward appearance and as a mere figure. But what is missing is the very step that is crucial to the whole process – and in some respects better accounted for even in Locke –, namely how we are supposed to proceed from the incessant flow of impressions, the *inner film*, to the isolation and formation of *objects* of which Hume has as yet forgotten to tell us how we are to recognize them. For up to this point, we have only received and copied shreds of images, impressions that streak past. We have a *field of vision* that provides the material for our perception, a "rhapsody" of sensations. But the quality of an object, its function, its position in a relational structure (horse, military horse, racehorse, etc.), let alone a structured object, can never emerge from the simple "inflow" of images. In the case at hand, Hume presupposes this object as an animal "which is familiar to us". But *how* has it become familiar to us, how could a film of impressions enable us to grasp its essence, its behavior, fodder, function? To say noth-

[525] David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, p. 14.

ing of virtue! How do we imagine a *feeling* from our own inner feelings? We cannot grasp the meaning of virtue unless there is a social framework that provides the context for us to first of all understand the concepts of "good" and "evil". And there is no way for us to understand the meaning of virtue "from our inner feeling" unless we have already formed and understood the *concept* of virtue. What becomes evident even at this early point of the *Treatise* is a serious inconsistency in Hume's overall construction, and we begin to see the absurd consequences of the *copy theory*.

This at once leads to another problem, for our discussion of Locke has already shown how difficult, if not outright impossible, it was to assemble *simple ideas*, passively received as mere sensations, into *complex ideas* in the manner of a modular system and, inversely, break down *complex ideas* without remainder into *simple ideas*. It turned out that it was impossible for *sense experiences* to be transformed into universal concepts without a major interpretative and reflective mental effort and a categorial schema and frame of reference, and that therefore the doctrine that builds on *simple ideas* was simply impracticable. It also remained unclear whether it isn't *complex ideas* (let's for once, out of curiosity, retain this untenable concept) that we always perceive first and only then break down into *simple ideas* which, in turn, are given a name only after they have been isolated in and extracted from the complex idea by our understanding. The scientific theory of *vision science* will help us realize that the exact opposite to what Locke and Hume would like us to believe is actually true. Also, we had already shown with respect to Barry Stroud's example of the particular note sounded on a piano that it is in practice impossible for us to perceive impressions that we receive from the senses in the pure form of *simple ideas*, a fact that clearly compromises Hume's *theory of ideas*:

"*Using the vague criterion of simplicity suggested by what Hume says, it would seem that the idea of this particular red is itself complex, since it has a particular hue and a specific intensity, both of which can be distinguished from each other. Similarly, a particular note sounded on a piano would seem to give us a complex impression, since its pitch is something different from its timbre.*"[526]

Even without further elaborating on Stroud's example, for instance by considering the note in its relation to musical scales, it becomes evident that even something as simple as a note sounded on a piano is not really *simple* in terms of a pure *perceptual atom*. The concepts of *simple* and *complex ideas* failed to work out already in Locke, as we have seen, but Locke at least had the rudimentary structure of the "operations of the mind" and the beginnings of a theory of language. With Hume, in contrast, we are quite clearly in the presence of an *image-like* or *film-like* model of the

[526] Barry Stroud, Hume, Routledge London/New York 1990, p. 20f.

consciousness. Even isolating an object from the field of vision is in principle impossible – as is any grasping of its functions, its various relations to other objects, or its living conditions, as the example of the horse clearly shows – as long as all this is supposed to happen by custom and on the basis of a purely sensory "film" and the uniting "soft power" of association. I hope that by now the impossibility of Hume's *Theory of Ideas* has become evident, so that I don't want to torture the reader with further examples and considerations.

As a final comment, there has never been a more detailed and more passionate analysis and unmasking of Hume's theory than the one done by his compatriot Thomas Hill Green, one of the major masterminds of *British idealism*. In 1874, T.H. Green, with T.H. Grose as a co-editor, published Hume's philosophical work, and his 370-pages (!) introduction grew into a reckoning with the entire British empiricist tradition from Locke and Berkeley to Hume. Trained in the thinking of Kant and Hegel, Green obviously saw himself forced to raise the same objections as those raised by me in the above discussion, also starting out from the absurd doctrine of *simple* and *complex ideas* and ending up with a critique of Locke's and Hume's entire theory of ideas. But in contrast to my critique which focuses on empiricism's *denial of innate knowledge* and its *inexplicable theory of abstraction* as well as its *flawed perceptual theory*, Green offers a survey of the entire world of empiricist ideas and meticulously points out one inconsistency after the other. This makes for hard reading since Green keeps oscillating between an account of the flawed doctrine, a review of its absurd consequences, and a deconstruction of its erroneous approaches. Still, as W.J. Mander notes in his highly interesting study "British Idealism," *"that attack was immensely influential. Green finished his introduction with an injunction to students to put away what he dismissed as the anachronistic systems of empiricism and turn instead to Kant and Hegel, and that is what they did."*[527] Unfortunately, thinkers of the stature of a T.H. Green have today more or less fallen into oblivion, for although this kind of criticism is indispensable for any understanding of empiricism's many flaws, the publishing platform featuring Green's work today is the "Forgotten Books" series.

## Hume's flawed doctrine of abstraction

One last issue I propose to discuss in this context is the peculiar method Hume devised for the abstraction process. As it is, empiricism's basic problem with respect to abstraction is the simple question of how the mind is supposed to proceed from particular *sense experiences* that are

[527] W.J. Mander, British Idealism, Oxford University Press, Oxford 2014, p. 62–66.

always simple and particular to *universal concepts* such as "red" or "round" and, what is more, *abstract concepts* such as value, principle, or necessity. Obviously, these concepts imply contents that *generally* refer to all objects of a kind or species, or to all relations of a specific kind. The *universal* and the *necessary*, these "hallmarks" of rational thinking, are absent from empiricism's account of how to get from perception to abstraction. We have already examined Locke's effort to overcome this problem by a theory of words, selective attention, omission and a method of obtaining the abstract concept by separating ever more particular characteristics from the particular thing. With Hume, who acknowledges nothing but the "stream of images" and is strongly oriented to Berkeley in this respect, the problem now comes to a head. Interestingly, in his earlier work, the *Treatise*, an entire section – Book 1, Part 1, Sect. 7 – is still devoted to the problem of abstract ideas. In his later "*Enquiry*," the problem is barely touched upon, for instance with the misleading argument, taken from Berkeley, that it is impossible to imagine a triangle capable of universality and at the same time representing all possible kinds of triangles because it could not all at once be equilateral, acute-angled, obtuse-angled, isosceles, etc.; which of course no single triangle can do in this form. Hume therefore concludes that it is equally impossible for us to have *universal ideas* that are capable of expressing the universal concept in our mind's eye.

George Berkeley, too, strongly relies on image-based thinking and accordingly holds that one can only imagine objects that are concrete, individual, and always particular. He explicitly denies that one might ever be capable of conceiving something *universal*, arguing that there is always only *one individual specimen* of a thing in one's mind, which is however supposed to become somehow representative of all other individual specimens of the same kind:

"*Thus, when I demonstrate any proposition concerning triangles, it is to be supposed that I have in view the universal idea of a triangle; which ought not to be understood as if I could frame an idea of a triangle which was neither equilateral, nor scalenon, nor equicrural; but only that the particular triangle I consider, whether of this or that sort it matters not, doth equally stand for and represent all rectilinear triangles whatsoever, and is in that sense* universal."[528]

Thus, for Berkeley, the process of abstraction means that there is just one concrete, individual triangle in our mind's eye for us to "*consider*" but that "*it must be acknowledged that a man may consider a figure merely as triangular, without attending to the particular qualities of the angles, or relations of the sides*" (loc. cit, p. 19). The word *triangle* would, then, denote and seal this process. This approach is of course diametrically opposed to the one

[528] George Berkeley, A Treatise Concerning the Principles of Human Knowledge, Dover Philosophical Classics 2004, p. 17.

proposed by Plato, already discussed above. For Plato, what is important is not the concrete, seen or remembered triangle or the concrete circle (since, anyway, it is never perfect) but the way we think these figures. This "thinking" of the figures is, of course, achieved by what is *universal* in us (the mind) in relation to the idea, or concept, rather than obtained from the triangle or circle that we happen to see after it has been copied into our mind as a washed-out idea. With respect to the *circle*, this *universality* of the thought is, however, easier to comprehend since its *definition* essentially remains the same, regardless of whether the circle is small or large, made of metal or drawn on paper. A triangle, in contrast, has certain subspecies such as acute-angled, equilateral, etc. which, however, are basically subject to the same principle. This is why Berkeley chooses the example of a triangle because in this case, the argument that for determining it we depend on the specific triangle we happen to imagine appears to be more conclusive. Hume adopted Berkeley's seemingly astute objection almost word for word:

"*Let any man try to conceive a triangle in general, which is neither* Isosceles *nor* Scalenum*, nor has any particular length or proportion of sides; and he will soon perceive all the absurdity of all the scholastic notions with regard to abstractions and general ideas*."[529]

In the footnote to this sentence Hume directly refers to Berkeley, praising the latter's writings as "*the best lessons of scepticism.*" But all in all, this note in the *Enquiry* is one of the few passages where Hume addresses the problem of abstraction at all, which makes it so valuable for an understanding of his respective theory. He was either so sure of his take on the problem that he considered it unnecessary to re-discuss it in the *Enquiry*, or found it so unclear and muddled that he preferred not to go into it any further or, rather, was unable to do so. At any rate, in the *Treatise*, Hume still quite clearly says:

"Abstract ideas *are therefore in themselves* individual*, however they may become general in their representation. The image* in the mind *is only* that of a particular object*, tho' the application of it in our reasoning be the same*, as if it were universal."[530] (my emphases, WW)

This statement describes Hume's conception of the process of abstraction in its purest form; which, in my view, implies some serious points of criticism:

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529 David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, p. 116.

530 David Hume, A Treatise of Human Nature, Oxford University Press 2007, Vol. I, p. 18.

The first striking point is that in the examples, ideas and thoughts are referred to as images "*of a particular object*" and an "*image in the mind*". This is due to the peculiar characteristic of Hume's philosophy, namely that, as shown above, his starting point is a kind of *inner film*. Thinking here seems to take place not in terms of thoughts, respects, geometric relationships, proportions, methods or sentences but in a succession of *images*. It would seem that in his "one-man experiments" of self-observation he had actually only registered what he could perceive in the "inner film" of self-observation and edited out all that was "other". For if I try to think about the relation between identity or non-identity, for example, or about the best way to conduct a court hearing or some business negotiations so as to obtain an optimal result, I can't find any *image* in me. And yet I obviously can think about these things, organize my thoughts and express them in linguistic formulations. All this is nothing to do with *images*, there is nothing in it that is *observable to the senses*, and yet it is not nothing. This is the crux of Hume's approach: that to explain himself he constantly needs to use abstract concepts which, strictly speaking, ought not to exist at all if we go by his own method of imagery! By focusing on the *image* of the *object* in the mind, which is Hume's starting point and which he then seeks to treat as a representative, he fails to see that, in truth, we always already possess the *function* and *capacity* of the object in the *concept* of this object, that is, by the workings of our understanding rather than from the surface image. Using the circle as an example, we have already demonstrated this in the above. Even if I have just *one particular image* of an object, let's say a sheepdog, I may take it to be representative of all dogs because *in the concept* "sheepdog" I have already *universally defined* it and *differentiated* it from wolves, other types of dogs or similar animals.

Secondly, Hume, as discussed above, keeps referring to a "*particular object*" that we need to see as an *image* if we are to be able to develop *universal thoughts*. This *individual object* – the most frequent example being a triangle – is, then, denied the capacity to represent all cases of triangles in its image-like representation, and the argument is that we cannot conceive of the image of a triangle that represents *all possible cases* of triangles. Now, this raises a number of further issues. The first one is whether at the level of *image-based* representations, this image must always be an *individual* one and whether the representation couldn't also be a general conception such as, for instance, a *schema* that is not perfectly identical with the object but *by this very fact* more appropriate as a means of symbolizing the universal. What I see in my mind's eye when I imagine a triangle, for example, is (for whatever reason) an orange triangle on a black background whose sides even seem to be slightly deflected and about which I cannot be more specific except for saying that it has three corners and

three sides. But what is required of the *concept of a triangle*, in the first place? A figure that has three corners and three sides. That the sum of the angles must always be 180 degrees is not yet important at this level of representation, nobody has ever known this spontaneously by imagining a triangle. So, with a certain amount of *vagueness*, I can imagine a triangle that sufficiently answers to the universally required characteristics of the *concept of a triangle*, that is, it has three corners and three sides. Even though I see the sides as somewhat deflected with the "eyes of the mind," I know what kind of a geometrical figure this is and am able to conceptually distinguish it from a circle or a square. Thus, even an imperfectly imagined triangle *represents* the object *clearly and distinctly enough* because the representation doesn't need to be, or even shouldn't be, individually perfect in order to be able to *schematically* represent the object. If I imagine an *equilateral* triangle, I have already *gone beyond* the universal concept "triangle," for the requirement now is that the sides be of equal length, so this representation can no longer comprise all figures with three corners and three sides. If Hume had chosen the example of a circle, things would have been simpler still, for everybody understands that a circle in general needs to answer to the *definition* of the circle, so even as an image in the mind's eye, every imagined circle will essentially answer to this "archetype".

Bertrand Russell, one of the founders of analytic philosophy, also addressed this question, describing a representation that is based, unusual for him, not on the outward appearance but, quite rightly, on *function*:

"*An image may thus come to fulfill the function of a general idea. The vague image of a dog (…) will have effects which are only connected with dogs in general, not the special effects which would be produced by some dogs but not by others. Berkeley and Hume, in their attack on general ideas, do not allow for the vagueness of images: they assume that every image has the definiteness that a physical object would have. This is not the case, and a vague image may well have a meaning which is general.*"[531]

Russell here comes very close to the solution of the problem, namely that a *general representation* does not need to be imagined as precisely as a real individual object needs to be. Kant sometimes uses the example of a dog in this context, so it is not implausible to assume that Russell draws on Kant at this point. Kant himself described this mode of a "monogram-like" *general representation* achieved by our imagination in his *Critique of Pure Reason*:

"*It is entirely otherwise with the creatures of imagination, of which no one can give an explanation or an intelligible concept; they are, as it were, monograms, individual traits, though not determined through any assignable rule, constituting more a waver-*

[531] Bertrand Russell, The Analysis of Mind, London: G. Allen & Unwin: New York: Macmillan 1922, p. 209.

*ing sketch, as it were, which mediates between various appearances, than a determinate image, such as what painters and physiognomists say they have in their heads, and is supposed to be an incommunicable silhouette of their products or even of their critical judgments*." (CPR, B 598)

This reflection contains a central insight and the key to our whole inquiry. Kant first explains that this schematic presentation is achieved by the *imagination* through a kind of schematic presentation in *monograms*, the "*how*" of which he is, however, unable to explain in any detail. In his description of the process, he therefore confines himself to examples and metaphors. For on the one hand, these schematic representations are "*not determined through any assignable rule*" and, thus, fundamentally differ from his definition of the *concept*! But this means – and this is crucial – that even at the *visual level* of representation, there is an *operation* that is *comparable* to conceptual thinking and that, although it lacks the precision and the force of a rule, is nevertheless capable of distilling, schematically unifying, and "condensing" the *universal* from the multitude of particular aspects and particular representations in a way that allows for the *universal*, the *universal traits of the gestalt*, to emerge as a schema from the multitude of different particular representations. We will return to this fundamental insight in the chapter on schematism.

At the same time, these *monograms* or *schemata* do describe the object(s) imagined as adequately as "*painters and physiognomists*" do who can produce, with a few pen strokes, the caricature of a well-known politician or of a profession, for instance a firefighter or a policeman, in a way that fundamentally differs from a photographic portrait in its technique of representation but still allows the viewer to recognize who or what this is supposed to be. The same is true for the representation of an empirical concept (often with a dog as an example): everybody may have a different mental image of a dog but is nevertheless obviously capable of recognizing, by thinking, in this "*wavering sketch*" or "*silhouette*" a figure that mediates between various appearances of dogs which are, after all, clearly (and even in the absence of "*any assignable rule*"!) known to be dogs. Thus, Hermann Mörchen, for instance, refers to the example of a schematic representation of the concept "fish" in a scientific textbook,[532] which is at once understood as signifying fish in general even though the individual representation does not show a specific, particular fish as required by the doctrine of Berkeley and Hume. Kant's description of a "*wavering sketch*" in turn points to Stephen Kosslyn's theory of *mental imagery*, which will be discussed in detail in a later part of this book. With all this, we can say that we have established and clarified how *universal representations* of an empirical object can indeed be imagined and are not

[532] Hermann Mörchen, Die Einbildungskraft bei Kant, Tübingen 1970, p. 117.

necessarily limited to a specific individual specimen that has been arbitrarily singled out to represent all the others.

A 1913 work by Max Brod and Felix Weltsch, "*Anschauung und Begriff*," is of particular interest in this respect. In it, they present their studies in the psychology of memory, which are inspired by *gestalt theory*,[533] and arrive at the seminal conclusion that it is the very "*vagueness*" of *general* mnemonic images, or representations, that opens the possibility for the concept to be *general*, in the first place; the very fact, therefore, that one does *not* remember an object by a *precise* mnemonic image but by an image that is *blurred* or *vague*. To describe this representation, Brod and Weltsch introduce the "formula" A + x, where A is the constant, identical, essential element of the mnemonic representation of, say, a stag, while x represents the changing, non-essential traits. Ernst Cassirer who discussed Brod and Weltsch's discovery in his *Philosophy of Symbolic Forms* criticized this approach as insufficient. He first finds fault with the symbol (A + x), which is indeed somewhat unfortunate since what it is supposed to symbolize is a "productive synthesis," that is, from the perspective of the *concept of function*, a process of the form f(x), and a summation is surely inappropriate in this case.[534] But Max Brod and Felix Weltsch – both of whom, by the way, were forced to emigrate to Israel right before World War II – were literati and arguably less versed in mathematics than Cassirer was. Therefore, they were probably unable to draw up the correct mathematical formula for their quite relevant discovery. This, however, is not important because for understanding their thought, which is indeed understandable, no formula is needed. Moreover, a synthesis of a vague and blurred representation of this kind may not lend itself to a mathematical representation at all. And, finally, Cassirer, seeking to illustrate why he deems Brod and Weltsch's approach to be unsound, offers a practical example which, however, rather demonstrates that he himself failed to really grasp the essence of this seminal idea:

"*In this theory, consciousness resembles a photographic plate, on which in the course of time various images are produced which overlap and mix with one another, until they finally become a single unclear image*." (loc. cit., p. 313)

Cassirer's objection here is that this process fails to clarify how the concept is supposed to fulfill its *logical function* of representation since it is nothing but a random empirical superposition of individual perceptions (like it is done with photos of faces sometimes, looking for the average face) and by this very fact falls short of the rule-guided cogency of the

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533 Max Brod, Felix Weltsch, Anschauung und Begriff, Grundzüge eines Systems der Begriffsbildung, Leipzig 1913, p. 72–77.

534 Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 309ff.

concept. This reasoning is, in principle, correct as long as it applies to a random superposition of particular images of an object. If, however, we assume an *innate* basic organization of the visual system as demonstrated in *gestalt theory*, the facts suddenly present themselves in a rather different light. For, then, the *productive* and *schematic* synthesis of mental images may indeed be based on a certain process, separating the essential from the accidental features of the representation of an object, thus building the "*primal layer*" of the concept, which is precisely what Cassirer sought to account for in his concept of "*symbolic pregnance*". Here, however, he seems to be unable to see the forest for the trees. I will return to this central point later.

All this leads to the further question of whether it is possible at all to imagine an *individual object* with such a degree of *perfection* that it can fulfill the *exemplary function* as concisely as Hume and Berkeley assume. Not only because the copies in Hume's "copy mode" are as such already described as exact, but washed-out. If, for instance, I try to imagine my dog as *the* specimen that universally represents all dogs in my mind, I cannot imagine him in every single detail although I know him very well – too many hairs by far! But Hume implicitly suggests that this is possible. A geometric figure such as the above-discussed triangle offers itself to this trick because it is such a simple figure, and although Hume actually abhors geometry and still seeks to exclude it from the exact sciences even in the Treatise, it is good enough for him to use for this skeptical ruse of war. Now, if it were really true that one always needed to imagine *only the well-known individual image* in order for it to become representative and, as such, universal, what would a simple conversation in the Humean mode be like? Talking about the growing number of dogs that roam the streets, for instance, the word "dog" would always conjure up the *perfect individual mental image* of my own dog, which image would just have to be multiplied in order for it to stand for several dogs, and there would always be the mental image of the same street before my house, which again would just have to be multiplied, and so forth. Similarly, ordering a soup in a restaurant would always conjure up the perfect individual mental image of the soup that one saw at the age of two – provided one can remember this concrete particular image at all. Absurd. In any case, the important result of Brod's and Weltsch's experiment and Russel's argument before is the refutation of the Humean assertion that we can never have *universal* ideas or imaginations. If they are *vague*, they can perfectly well represent the *essential* features or properties of a universal concept in a schematic way, whether it is a triangle or a dog.

It is interesting to take an anticipatory look at Kant's *schematism* in this context. For Kant grapples with the problem that at a certain point, *intuition* and *concept* need to come together or, rather, intertwine in order

for cognition to be possible at all, and for individual imagination of objects to be subsumed under concepts; that is, for concepts to become intuitive and for intuitions to become conceptual. This synthesis is achieved by the *imagination*:

"*The schema is in itself always only a product of the imagination; but since the synthesis of the latter has as its aim no individual intuition but rather only the unity in the determination of sensibility, the schema is to be distinguished from an image. Thus, if I place five points in a row, ….., this is an image of the number five. (…) Now this representation of a general procedure of the imagination for providing a concept is what I call the schema for this concept. In fact it is not images of objects but schemata that ground our pure sensible concept*."

Here Kant, with his profound insight into the problem, refers to a *procedure* that needs to be applied when we seek to reorganize objects by schemata-based reproduction so we can conceptually grasp them. The five dots could also be organized in the manner of a dice, but I suppose that Kant wanted to emphasize the counting in time as the inner meaning, that is, the "in a row". Kant then refers to Berkeley's and Hume's argument of the triangle:

"*No image of a triangle would ever be adequate to the concept of it. For it would not attain the generality of the concept, which makes this valid for all triangles, right or acute, etc., but would always be limited to one part of this sphere. The schema of the triangle can never exist anywhere except in thought, and signifies a rule of the synthesis of the imagination with regard to pure shapes in space*."[535]

Thus, Hume's doctrine of *general concepts* that are somehow derived from images is completely counteracted by Kant who makes it plain that the "*schema of the triangle can never exist anywhere except in thought, and signifies a rule of the synthesis of the imagination*". For even the imagined individual triangle fails to attain universality in this representation, e.g. the idea of the oblique-angled triangle. With *schematism*, Kant offers an original *procedure* that allows concept and intuition to logically intertwine in the imagination by forming a *monogram*, a mediating schema which Kant describes as "*more a wavering sketch*," a "*silhouette*" of the object. However – and, here, Kant seems to depart from image-oriented reasoning – the "concept-like" element, that is, the *universal traits*, must already be integrated into the schematic representation that results from the many particular images, for otherwise no correlation between the schematic image and the concept would be possible. The traffic sign "wild animals crossing," for instance, shows the schematic representation of a stag that jumps from right to left. It is not an image of an individual, particular animal,

[535] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, B 180, p. 273.

there is nothing of a photograph about it; rather, it is a genuine *gestalt* where only the *essential traits* of this animal are schematically represented while all that is *accidental* has been *omitted*. This representational mode is thus perfectly capable of concretely representing the *universal* idea and eliminating methodically all that is *accidental*. When we are confronted with these schematic universal mental images, the visual procedure *must* be capable, at least in the domain of what is concrete and intuitive, of performing the same task as the concept, namely omitting, with necessity, all that is *accidental* and represent the *essential universal figurative traits* as a *gestalt*. Thus, it is a *visual procedure* that anticipates the regularity of the conceptual, or is its pre-stage.

The second question, which has not even been touched upon in all this, is the representation of *abstract concepts*, for the cases referred to by Hume always consist of the *image* of an *individual object* – a triangle or a dog – that has at some point been copied as an image from the "inner film" so as to represent all *similar* specimens (which incidentally gives fresh topicality to the problem of *resemblance*!) and is now taken out of the storage compartment of the mind. All these, then, are not *abstract* concepts. But *HOW* does Hume ever arrive at an *abstract concept* at all if all there is for us to start out from is the washed-out copies of the "inner film"? This is a question that Hume was simply unable to answer. He only notes that, surprisingly, it is possible to rationally discuss abstract topics, but never presents a solution to the problem – screening his writings for an answer is just futile. No wonder, when all content of thinking is washed-out images Even Edward Craig registers some surprise at this:

"*But, here, Hume doesn't just say that these inward images may occur from time to time, he goes so far as to claim that they make up all of our thinking. And yet I can't ascertain their presence even in my own case, where I would surely notice them. What I can safely say, I think, is that mental images do occur from time to time in my thinking; but as for their being so numerous as to make up its whole content – and this is what they ought to do if my thinking was to consist of them alone – I don't see any evidence.*"[536]

But let's once more return to the sentence where Hume seeks to show how empiricism conceives of the actual process of abstraction:

"*The image in the mind is only that of a particular object, tho' the application of it in our reasoning be the same, as if it were universal*."

Let's, then, leave aside all the objections we have already raised – that thoughts are not always internal *images*, that we *can never exactly conceive of* the individual thing as an image, and briefly consider what Hume con-

[536] Edward Craig, David Hume. Eine Einführung in seine Philosophie, Frankfurt/M. 1979, p. 51.

cretely claims in this passage: he refers to the "*application*" of the *image* of a "*particular object*" "*as if*" the image "*were universal*". This is how, quite plainly, he conceives of and presents the process. But what Hume actually teaches is this: first, he has a *field of vision* of figurative impressions, a manifold he can allegedly – as discussed above – "*accurately*" copy into washed-out ideas. This results in an *inner film* of particular "ideas" that, however, cannot yet carry any determinations or any concrete knowledge of the object. He then surreptitiously obtains *objects* from this film and integrates them into his treatise without ever having described in any detail how they are actually determined, that is, formed and differentiated; and after that invokes *language*, whose origin he has never been explained and whose *grammar*, let alone the *function of concepts*, he has never accounted for (we have previously used a quotation from Alois Riehl to describe the problem).

And now for the final sleight of hand: Hume takes the *object he has surreptitiously obtained*, an animal, for instance, to which he applies the name tag "dog" (the copied image in his mind's eye is now called a *dog*) which, however, given its *function as a concept*, *always already comprises* all dogs *as universal*! He then "*applies*" dog, whose universal meanings the concept has already *tacitly* supplied, "*as if*" it was the "*universal*" representative of all dogs. This implies, firstly, that he would need to always already know what these *universal qualities* and *traits* are and in *which way* the individual dog is suited to represent *all* specimens of the concept "dog" although this concept can never be derived from the copied specimen since the latter is *always particular* and the only one (according to his own doctrine) he can draw on. And, secondly, that he can apply the individual dog "*as if*" he was *universal* only because he tacitly and "parasitically" uses the *concept* "dog" where the *universal essence* of the dog and, thus, all dogs, has always already been crystallized out and which, being a concept (such as he has come to know and understand it), always already comprises the *rule* for its application. This is the fundamental, and unconscious, *circle* that is a standing feature of every empiricist's thinking but is never acknowledged because he or she is not at all aware of, or actually blind to, all that is surreptitiously being obtained at every step. It is what I call empiricism's *mechanism of self-deception*, and the more self-critical and more well-read proponents of EAN who do have a vague feeling that there is a fundamental flaw somewhere, occasionally – in some "*unguarded moments*" – even admit it.

Ernst Cassirer, too, has highlighted this fundamental flaw in Berkeley. For, as argued above, what Berkeley and Hume actually do – and which comes to be expressed in the phrase "*as if*" – is tacitly assign a *representative function*, *a rule* to the particular image-copy:

"*For he, too, with all his opposition to the general idea, leaves the universality in the form of the representative function intact. A single concrete, intuitive image, a triangle with a definite magnitude of sides and angles, can despite its concrete character stand for all other triangles, can represent them for the geometrician. Thus from the intuitive idea of a triangle arises its concept – and this does not mean that we simply obliterate certain determinations that are contained in it but that we posit them as variable. What holds together the various structures which we regard as examples of one and the same concept is not the unity of a generic image but the unity of a rule of change, on the basis of which one example can be derived from another and so on up to the totality of all possible examples. In rejecting the unity of the generic image, Berkeley does not contest the 'unity of the rule'.*"[537]

Thus, the last of Hume's sleights of hand – using *"as if"* to mask his assigning the representative function of a *universal concept* to a particular representation – has been exposed, and in conjunction with all the other inconsistencies and flaws nothing is left of the EAN abstraction procedure. In his writings, Hume hasn't given, and couldn't give, a really adequate explanation of *HOW* the formation of *abstract concepts* from the "inner film" is supposed to happen, but in the empiricists' defense it must also be said that this is simply asking too much. Forming *universal* and even *abstract* concepts on the basis of a *tabula rasa* or *dark cabinet* that lacks innate structures, a film of washed-out ideas that streak past, a thinking in random *associations*, and a language said to be acquired by training in terms of drill ("Abrichtung," Wittgenstein) or "training on the part of society" (Quine) and consisting of nothing but names is plainly and simply impossible!

Having thus analyzed the basic thoughts and methods of Hume's philosophy, and having exposed their utter inconsistency and impracticability, I am seized with the utmost consternation. So, this is supposed to be the basis of current EAN philosophies? For confirmation, I once more turn to Edward Craig, and – yes, there is indeed something I must have overlooked, for in his interpretation of Hume's "*Enquiry,*" he writes:

"*We had to conclude that parts of Section 2 (as well as the respective chapters of the Treatise) were not well thought through. The distinction between representations and impressions was not clearly defined, nor was the conceptual pair of simple/complex clearly introduced. Also, a counterexample that threatened to jeopardize his thesis* (the example of the shades of blue, my note) *was speedily dismissed with the not very convincing remark that it was a particular case. And, finally, Hume, more or less refraining from comment, engaged with a rather dubious theory of the nature of the thought process*."[538]

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[537] Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 291.

[538] Edward Craig, David Hume. Eine Einführung in seine Philosophie, Frankfurt/M. 1979, p. 55.

So even among the more "charitable" commentators there is some awareness, after all, of Hume's superficialities, inconsistencies and flawed constructions. But how does Craig explain that all these errors and illogical parts are still found in the *Enquiry* which Hume published many years after the *Treatise* as a redacted and condensed final version of his philosophy? Craig emphasizes that Hume was probably more interested in the form of the presentation than in the issues discussed, and suggests that in spite of all these flaws one should keep in mind that even a genius is, after all, just a human being:

"*Also, it should not come as a surprise that Hume occasionally tends to rather uncritically adopt and integrate an insufficiently thought-through doctrine of his predecessors into his work. I prefer to think that Chapter I of the Treatise is a case in point. Except for some details (…) the entire content is adopted from Book II of Locke's 'Essay Concerning Human Understanding*." (loc. cit., p. 55f.)

So, Locke's and Hume's image begins to revert to what it was in the above after all. Book II of John Locke's "*Essay*," i.e. its *empiricist core*, is qualified as "*insufficiently thought through*" by Craig, and Hume is found out to have *uncritically adopted* it. And Craig has no conclusive answer to the question of why Hume had nothing better to say even in the "*Enquiry*" that was published so many years later. In the final analysis, it would seem that EAN commentators, too, opted for a "*charitable reading*" or did an ideological kowtow, for any objective and critical assessment will find that even before Kant's transcendental philosophical turn, not much was actually left of Hume's philosophy.

## Experience, experiment, and observation

Having demonstrated the inconsistency and impracticability of the epistemology and the entire doctrine of perception and concept formation as proposed by Locke and Hume, I'd like to discuss, as a conclusion and before turning to the positive part of my work, some typical prejudices and presumptions of empiricism and EAN in connection with the sciences in general that one keeps hearing or reading. It is impossible to continue the critical review of historical mutations of Empiricism, like Neoempiricism, Positivism, Analytical Philosophy, Wittgenstein's language games, etc, since all those methodological inconsistencies would fill hundreds if not thousands of pages. There is no doubt whatsoever that empiricism has played a highly fruitful and significant role in the history of enlightenment. The widening freedom to think, the turn toward empirical experiment, research and the natural sciences, individualism, skepticism regarding religion and superstition – all these major founding stones of liberal, modern societies were enhanced and promoted by Bacon, Hobbes,

Locke and all of British empiricism (although ideationally, with perhaps the exception of religion and within the realms of possibility of the day, they had to a large extent already been established by Descartes). So, as a historical movement, empiricism should definitely be seen as a positive element, and Nicholas Jolley is certainly right in pointing out that the moral and sociopolitical concerns that motivated Locke, in particular, when he wrote his Essays are often ignored in favor of other interpretations.[539]

My love of England and the English way of life alone would have made it easy for me to embrace empiricism and live quite comfortably in the ill-conceived EAN world. But let's not forget that when the British Empire had reached its greatest expansion and the height of its power under Queen Victoria, it was Kant's and Hegel's idealism that prevailed in English intellectual life, and continued to do so until after World War I, when it was (at least in part) replaced by a different orientation. Of course, observation and the real-world verification of findings is a typical *attitude* of every researcher, and meaningful new discoveries can only be made if *hypothesis-guided experiments* are carefully *devised*, *imagined*, *designed*, *initiated*, *carried out*, *tested*, *analyzed*, *reported* and *communicated*. The same is true for *thought experiments* which are also designed, carried out and thought through but cannot always be verified in a real-world setting, for instance when dealing with issues such as what would happen if we were ourselves travelling at light speed. But all these are activities of the *understanding*. In my view, every true "*experience*," "*observation*," and "*experiment*" is a manifestation of a *rationalist* way of thinking, it is predominantly concentrated, creative and perseverant logical *thinking*. And, yes, of course, one also needs to open one's eyes and look, or go to the lab and prepare the equipment needed for the experiment, or type the study protocol and carry it out in a hands-on way, and insofar research activities do have their empirical components, but that's as "empirical" as they ever get.

The nature of empiricist thinking or, rather, its self-deception, comes to be expressed by the fact that whenever a question or a problem cannot be solved, or has resulted in an aporetic situation, "*experience*" presents itself as the only way out. But even "*experience*" – which in empiricism actually denotes, strictly speaking, only *sensations* or "*sense experiences*" – goes only so far, as already Kant cautioned: "*…; for experience itself is nothing other than a continual conjoining (synthesis) of perceptions. There remain for us therefore only synthetic propositions* a priori, …"[540]

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[539] Nicholas Jolley, Locke – his philosophical thought, Oxford University Press 1999, Introduction.

[540] Immanuel Kant, Prolegomena to Any Future Metaphysics, General Question, § 5, Cambridge University Press 1997, 2004, p. 27.

Due to the dogmatic claim to power of logical positivism and the noxious combination of behaviorism, positivism, the cold war, and faith in technology, the – initially positive – basic attitude of empiricism has since the mid-20th century mutated into a dogmatic and arrogant philosophical movement, as has already been pointed out in the introductory sections of this book. This often goes along with an effort to make us believe that the rise of the sciences and scientific progress as such was due to EAN alone while all around there was nothing but troublemakers in the guise of gloomy mystics and irrationalists. This assumption, still current today, is based on a very superficial *concept of experience* that keeps resurfacing from the early 20th century to Karl Popper and has been thoroughly and systematically criticized by Ernst Cassirer in his "Philosophy of Symbolic Forms," as well as by Friedrich Kambartel, Herbert Schnädelbach, and the Frankfurt School in general.[541] Concretely and empirically, however, it can be shown that in the German-language area and in France, advanced technology, scientific research, innovations, or Nobel Prizes were no less present at the time of Neo-Kantianism, i.e. from 1860 to 1918, nor were they absent from England where idealism prevailed at the time, nor later from the USSR of "dialectical materialism," nor, sad to say, from Nazi Germany. Thus, it's not due to empiricism alone that engines have become more and more powerful, sputniks and space stations have been launched, superior panzers have been developed, or medical research has progressed. All this has more or less successfully been going on almost everywhere. It is just the superficial cult of empiricism, or Scientism today, that would have us believe that *experiment* and *observation* are an empiricist prerogative.

So, let's take a closer look, for in empiricist writings the concept of *experience* is predominantly used in an imprecise and ambiguous way. In the EAN doctrine, "*experience*" is used in its first meaning and denotes the *sense experiences* that, according to Locke and Hume, *passively* imprint themselves as *sensations* and *impressions* on the *tabula rasa*, the *empty plate* that is supposed to describe our mind. The second, more general meaning describes what is denoted by the German concept of "Erfahrung," that is, the experience a person gains over time from various situations and conditions that are *remembered* and *reflected on* and subjected to frequent *reassessments* in view of *drawing conclusions* and *learning* from them. Unlike the fly that collects many sense experiences but is unable to occasionally draw an adequate conclusion from them, human beings are in most cases able to *learn* something from the situations they find themselves in, which is what, when observed over time, is called *life experience*. But this life

[541] See Friedrich Kambartel, Erfahrung und Struktur – Bausteine zu einer Kritik des Empirismus und Formalismus, Frankfurt/Main 1968; Herbert Schnädelbach, Erfahrung, Begründung und Reflexion, Frankfurt/Main 1971; Helmut Holzhey, Kants Erfahrungsbegriff, Basel 1970.

experience is, of course, gained through *reflection*, *applied reasoning*, rather than from *sense experiences*. Experience, then, describes the practical everyday learning of something new, and in the sciences experience in general denotes the systematic observation or examination of hypotheses by way of experiments or field trials. Empiricism, however, tends to use one or the other of these meanings of experience as it suits the occasion. The first form of "experience," namely *sense experience* in the strict sense, is the epistemically correct term as used in the writings of the classic empiricists. Even Kant's "*Critique of Pure Reason*" famously starts out from experience, namely "*intuition*" ("Anschauung"), the "*affections of sensibility*" by the senses. In his pivotal critique of empiricism, "*Erfahrung und Struktur*," Friedrich Kambartel emphasizes that as early as in Aristotle, experience was conceived of as the *conceptual grasping* of the *universal* in many *particular observations*:

"*Experience, if we are to summarize Aristotle's propositions concerning the term* 'empeiria,' *is the possibility, acquired through the knowledge of many particular phenomena, to perceive, i.e. be aware of, the universal in the particular. Experience in this sense unfolds in two respects, the assessing of the particular by the universal and the recovering of the one universal from the many particulars*."[542]

Thus, even Aristotle, the very philosopher who, due to a general misinterpretation (and in contrast to reprehensible, elitist, idealist Plato whom Popper blamed for all forms of totalitarianism),[543] was chosen by EAN as their shining light among the ancients had a concept of experience that focused on the grasping of the *universal* in the particular and individual, that is, the grasping, by thinking, of invariant forms. In Aristotle, sense experiences constitute a "primitive" starting point, but nothing more. Kambartel then proceeds along the lines of Kant's introductory reflections that *"there is no doubt whatever that all our cognition begins with experience;"* that is, *"through objects that stimulate our senses" and thus "bring the activity of our understanding into motion"* (CPR, Introduction <B>, B 1). Kambartel quite rightly criticizes that at this point Kant, having let himself be tempted into following Locke and Hume too far towards the empiricist position, actually refers to a passive reception of "the raw material of sensible impressions" (loc. cit.):

"*For here we find, just as with Locke's 'passive' perception, a receptive element of cognition, sensible intuition, whose function it is to receive the 'impressions'… That the givenness of objects is constitutive for intuition, as Kant emphasizes, while for the understanding it is their being thought can also be understood in terms of Locke's*

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542 Friedrich Kambartel, Erfahrung und Struktur – Bausteine zu einer Kritik des Empirismus und Formalismus, Frankfurt/Main 1968, p. 55.

543 See Karl Popper's propagandistic work *The Open Society and Its Enemies* [1945], Princeton University Press 2013.

*distinction between passively received simple and particular ideas (that is, the given objects of cognition) and nominal essences (the thought objects of cognition, e.g. in science).*"[544]

In the next chapter, "*Vision Science,*" I propose to show that there can be no such thing as a "*given*" that is *passively* imprinted on the mind. There is, of course, a physically received retinal image, and in this respect the term of "*raw material of sensible impressions*" is quite appropriate, but from the perspective of thinking there can only be something that has already been processed, selected, constructed, *taken*. In this sense, the entire doctrine of perception as conceived by Locke and Hume is, of course, utterly wrong, and even their use of the term "sense data" needs to be treated with the utmost caution since even "*data*" may well be understood as something that is initially *determined and formed by content*, which is definitely not the case with "*the raw material of sensible impressions*," as we will see. Kant, as mentioned above, had let himself be partly contaminated by the flawed empiricist doctrine (which has been consistently criticized by, e.g., the neo-Kantian Hermann Cohen),[545] but it should be taken into account that Kant occasionally overdrew a position in order to make his own view all the more salient. This is exactly what happens also in this case where Kant, after this exposition of a passive, receptive mode of perception, goes on to say:

"*But although our cognition commences with experience, yet it does not on that account all arise from experience. For it could well be that even our experiential cognition is a composite of that which we receive through impressions and that which our own cognitive faculty (merely prompted by sensible impressions) provides out of itself, …*"[546]

Kambartel then begins to outline Kant's strategy and contrast it with that of Locke, for unlike Locke, Kant explains ever more clearly and comprehensively that experience cannot arise from the chaotic material of sense experiences alone but only through the application, based on the preset organizing intuition in space and time, of the organizing functions of the categories *that are in our understanding*:

"*In Locke, the understanding is not described as oriented to an aim that would operate as a selective agent in its production. Concerning the material of its workings, the understanding is tied down to the given; and concerning the capability of breaking down and recomposing this material in various ways, there is either complete arbitrar-*

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544 Friedrich Kambartel, Erfahrung und Struktur – Bausteine zu einer Kritik des Empirismus und Formalismus, Frankfurt/Main 1968, p. 98.

545 Hermann Cohen, Logik der reinen Erkenntnis, Berlin 1902, p. 67. The problem is also discussed in Kurt Walter Zeidler, Grundriß der transzendentalen Logik, Cuxhaven & Dartford 1997, p. 19f.

546 Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 136 (Introduction <B>, B 1).

*iness or, insofar as conformity with reality is sought for, a choice that is random and unpredictable because it is again devolved to the level of the given, to 'experience' alone which, due to the unspecific nature of its involvement, is not bound by any set limits*."[547]

Kambartel's account of Locke's model of cognition is largely in accord with my critique of Locke in the respective chapter. *Experience* in the sense of structured cognition, reflective learning, is in truth impossible on the basis of this process. EAN keeps preaching "experience," mantra-like, but is quite unable to concretely explain its functioning, namely *how* it is supposed to happen. Kambartel, consistently sticking to Kant's path towards cognition and his statement that

"'*… the understanding itself, by means of these concepts,* [is] *the originator of these experiences*'," goes on to say: "… *if we first take the more general meaning of reason, then reason is 'the entire higher faculty of cognition,' and 'the rational' is opposed to the 'empirical'. Reason is one of the 'two stems' that our 'cognitive power' 'branches out into' where its 'general root' 'divides'*."[548]

Let's retain the crucial proposition in this context: "*the understanding itself, by means of these concepts,* [is] *the originator of these experiences*." This is the decisive point brought to light by Kant. Now the focus is no longer on the random sensible material of impressions but on "*the understanding*" that structures the material and is alone capable of logically organizing and assessing the world and, in the process, constituting the *universal* – which according to Aristotle is recognized in the particular – and becoming the "*originator of experience*." In Kant, "nature" is brought before the "court of reason," and this court has a right that due to the "*nature of our mind*" is unconditional and necessary:

"*Thus we ourselves bring into the appearances that order and regularity in them that we call nature, and moreover we would not be able to find it there if we, or the nature of our mind, had not originally put it there. … The understanding is thus not merely a faculty for making rules through the comparison of the appearances; it is itself the legislation for nature*, …"[549]

With regard to later chapters in this book, and more specifically the issue of innate faculties, it is important to already give some thought to, and keep in mind, the formulation "*if we, or the nature of our mind, had not originally put it there,*" i.e. if we had not brought "*into the appearances that order and regularity in them that we call nature*." Basically, it is a compre-

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547 Friedrich Kambartel, Erfahrung und Struktur – Bausteine zu einer Kritik des Empirismus und Formalismus, Frankfurt/Main 1968, p. 104.

548 Friedrich Kambartel, Erfahrung und Struktur – Bausteine zu einer Kritik des Empirismus und Formalismus, Frankfurt/Main 1968, p. 105.

549 Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 241–242 (A 125/126).

hensive description of the whole interaction between mind and nature: by its questions and judgments the understanding subjects what presents itself to us under the title of "nature" to laws, the laws of nature. Kant also says why we are able and empowered to do so: it is because the mental guideline, the yardstick, the compass, is "*in the nature of our mind*." Thus, nature, for us, is twofold: it is in the material we form by means of the laws of gestalt, the imagination and the understanding, and it is – and this is something Kantianism has as yet failed to fully acknowledge – in the "*nature of our mind*."

Now then, the nature of our mind or, in more modern terms, the innate structures of our mind, our thinking – where do they come from? Why is it in *our* "nature" to think in this way and no other? These are indeed intriguing questions for our subject, but I'd rather not anticipate the discussion in the respective chapters. What has been made very clear, however, is the fact that experience is *the result of consistently applied thinking* rather than the passive reception of *sense experiences*, the collecting of data. And the nature of the *experiment* has now been defined in Kant: it is the *application* of our powers of understanding, which contain the universal in themselves, to the particular and individual, i.e. to objects and matters. It is this "judicial" activity of conclusion and judgment that allows for *experience* to form, for appearances that at first are incomprehensible to become *comprehensible*, for what is confused to become *differentiated*, for what is obscure to become *clear*, as Descartes already taught, and for what is particular to become *universal*. Johann-Heinrich Königshausen has pointed out that the following observation in the preface to the second edition of the *Critique of Pure Reason* (BXIII/B XVIII) clearly shows that Kant developed the fundamental principles of understanding and reason in view of the practical application of these human faculties in the experiment:

"'*Reason, in order to be taught by nature, must approach nature with its principles in one hand, according to which alone the agreement among appearances can count as laws, and, in the other hand, the experiments thought out in accordance with these principles; …'. 'Inspiration' provides what we would call a hypothesis, 'what reason itself puts into nature,' ibid. The task of the critique, then, is to reveal the principles by virtue of which the construction of hypotheses is possible, in the first place.*"[550]

Proceeding, now, to the analysis of what *observation* and *experiment* actually mean requires a more comprehensive approach. In his legendary work, "*The Philosophy of David Hume*," Norman Kemp Smith describes the enormous effect that the writings of Newton, along with those of

[550] Johann-Heinrich Königshausen, Kants Theorie des Denkens, Amsterdam 1977, p. 159.

Locke, Hutcheson and Berkeley, had on the young Hume, and explains the importance of *experiment* as conceived by Newton:

"*Universal mechanics, in turn, must itself be similarly conceived. It starts with the factual, is limited to the factual, and in none of its conclusions is it able to transcend the factual – meaning by the factual what is de facto given in sensible experience and not discoverable or knowable in any other manner. In other words, experiment not 'hypothesis' is, Newton declared, the basis upon which alone truths in regard to matters of facts can be reliably based.*"[551]

Thus, Newton vehemently rejected *hypothetic thinking*, he wanted to start out from *facts* alone, confine himself to *facts*, deal with *facts* and nothing but *facts*, that is, with the apparently "*given*." Hume's "*matters of facts*" can thus be described as the echo of Newton's thoughts in philosophy. What becomes quite evident here is that the question of what can and may be considered *a fact*, in the first place, and how we come to obtain it is not even asked, nor is there anything to indicate that Newton was conscious of the problem at all. For we are all keen on the pure facts, nothing but the pure facts, and there is no lack of notorious cases where what once was considered a fact was later just smiled at, if only because much more sophisticated measuring devices had been developed, or new entities and forces had been discovered, or a shift in the entire paradigm and conception of a science had occurred. Newton's *gravitational constant* itself is a classic example of a *highly abstract generalization* that in truth is nothing to do, in terms of its abstract nature, with particular *facts* or observations, while the gravitational *force* of bodies can never be perceived by sense experience at all. On the contrary, as Ernst Cassirer once commented with respect to physical laws, for the *pure physical law* to emerge even the last concrete particular atom needs to be eliminated from it. Fundamentally, we are once again confronted with empiricism's proper *mechanism of self-deception*. But let's see what is Kemp Smith's further take on Hume in this respect:

"*Experiment is, Hume teaches, the final court of appeal in respect of all matters of fact. But it can supply only particulars, and even these only in the 'different circumstances and situations' appropriate to them. Experiment is the deliberate consulting of experience, with due regard to the particular and varying circumstances in which the phenomenon under investigation can be made appear. (…) Thus for Hume, the term 'experimental' is virtually equivalent to the term 'empirical', but is a stronger term, carrying with it the suggestion of a deliberate collecting of observations… to serve as a reliable basis for generalization.*"

Kemp Smith sees a parallel to Kant ("*court of appeal*") but clearly works out that, in the final analysis, experiment in Hume is virtually tantamount

[551] Norman Kemp Smith, The Philosophy of David Hume, Palgrave Macmillan 2005 (1941), p. 54.

to "*experience*" and ultimately, *qua* his theory of ideas, reduced to the *collection* of *particular, individual* sensitive *impressions* as images from which, then, *general insights*, *generalizations*, are supposed to be drawn. The hypothetic element, the entire theoretical and systemic-systematic framework, is absent in Hume as in a somewhat different way in Newton, and it is unclear how the *generalization* of an observation is supposed to be possible on the sole basis of laws of thinking in terms of *association*, which are the only ones Hume relies on.

"*He is so bent upon eulogising experience, at the expense of speculation, that this feature of controlled direction of enquiry receives no attention.*"[552]

This means that due to its excessive praise of experience ("*eulogising experience*") and the reifying concentration on devices, measurement results, data, that is, the "given," empiricism completely fails to grasp the real character, the essence and nature of the *experiment*, and that in the empiricist world of thinking there can only ever be the collection of what is individual and particular. Terms such as *fact* or *matters of fact* serve to simulate this alleged pure objectivity in the experiment, for actually experiments are always concerned with hypotheses, relations, thought connections, theories, that ultimately have been or are to be established in a certain *respect* or *theoretical framework*, as instructively laid out by Pierre Duhem in his seminal work "The Aim and Structure of Physical Theory" (1906).

Armed with these insights, let's examine some definitions of "*experiment*" such as they can currently be found on the Internet (the Oxford dictionary defines it as follows: *A scientific procedure undertaken to make a discovery, test a hypothesis or demonstrate a known fact*). German Wikipedia, for instance, proposes the following definition:

"*An experiment (from the Latin experimentum 'experiment, test, trial, verification') in the sciences is a study that is methodically designed to collect empirical information (data). Experiments are required in many sciences, e.g. the natural sciences, engineering, medicine, psychology, and sociology. In most cases, counting or measurement is an important component of the experiment.*"[553]

A contrasting definition can be found among the teaching material presented on another German Website:

"*With reference to the Latin meaning of experimentum, i.e. test, trial, verification, an experiment is a study designed to test and either verify or reject a specific assumption or conjecture. An experiment is a data collection procedure that is primarily used in the natural sciences as well as in social sciences such as psychology and sociology.*

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552 Norman Kemp Smith, The Philosophy of David Hume, Palgrave Macmillan 2005 (1941), p. 61f.

553 https://de.wikipedia.org/wiki/Experiment, 10 September 2015.

*In the experiment the accuracy of previously formulated claims is systematically tested by purposefully and actively modifying specific conditions of the experimental setup. Active manipulation is an essential feature of the experiment as compared to other methods of data collection. In this, the experiment is clearly distinguished from passive procedures such as, e.g., pure observation.*"[554]

The first definition in Wikipedia has a rather empiricist ring to it: the experiment is said to be "*a study that is methodically designed to collect empirical information (data). … In most cases, counting or measurement is an important component of the experiment.*" This definition is not only rather "reifying" but, what is more, offers no explanation whatsoever as to *why* the experiment is carried out at all. An experiment is carried out (and can be difficult, or dangerous, as in the case of the self-experiment, or expensive) because one wants to know or prove something, because one wants to answer a *question*. But the capacity of asking *questions*, the "why," is given far too little attention in EAN philosophy, anyway. If there was no question there would be no experiment, either. Quoting from Hermann Cohen's "Logik der reinen Erkenntnis," Helmut Holzhey notes:

"*The 'logical relevance' of the question consists in its being the 'lever of the origin'. The activity of asking questions is therefore also the 'foundation of the judgment', or the 'founding stone of the foundation'.*"[555]

The question is the "*lever of the origin,*" of thinking, because it suggests a *hypothesis*, albeit in a yet unfinished form since one has *discovered a discrepancy* between the existing knowledge and an anomaly but does not yet know what is at stake and how to proceed in order to obtain a sufficient answer to the question. If this were already known, no experiment would be needed. Paul Natorp has most succinctly summarized this nexus of *question*, *hypothesis*, and *experiment*:

"*The experiment always answers a previous question, that is, decides a possibility that was previously posited as a hypothesis.*"[556]

In his *Meno*, Plato demonstrated how *questions*, when adequately organized and oriented to the idea of the solution, will activate innate knowledge and, thus, enable an uneducated slave boy to produce the *insight* into the solution to a problem. The slave boy did not ask the questions himself because he was not yet capable of working out the "cognitive dissonances" that would have determined the direction he needed to

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554 https://www.e-teaching.org/didaktik/qualitaet/experiment, 10 September 2015.

555 Helmut Holzhey, Cohen und Natorp, Basel/Stuttgart 1986, p. 190.

556 Paul Natorp, Die logischen Grundlagen der exakten Wissenschaften, Leipzig/Berlin 1910, p. 89.

take to find the solution, but he could *understand* them due to the innate "*natural light*."

This means that in order to form a question at all one needs to have "*noticed*" something (as the empiricists would say) or, in psychological terms, needs to have been aware of a "*cognitive dissonance*." An anomaly, a departure of events from what was already known or, rather, realized through insight points to something unknown, something not yet understood. The crucial point here is that no question will ever arise from *pure observation*, or *sense experience*! The question can only ever arise from the innate "natural" light that "*perceives*" a difference with or discrepancy from what one used to know or assume, it can never arise from *sense experience*. Empiricism, positing the passive reception of sensitive impressions by an *empty plate* or *dark cabinet* and relying on the assemblage of the *atoms of simple ideas* (which do not exist in this form, anyway), is quite incapable of explaining *how* questions are supposed to arise from *experience*, which also rules out questions as a starting point! The *question*, however, is the very condition that enables the subsequent rational insight to spring up at all. Chronologically, the *question* does come after the perception, as described by Kant, but it can never arise from it since it is a genuine feature of understanding and reason, and not of *sense experience*. I may, for instance, look at a scalene triangle and empirically observe it for hours on end without being any the wiser. But as soon as a *question* arises, there is a different situation: if, for instance, I consider balancing the triangle on my fingertip, how can I – without touching the triangle – find the point that will allow me to do so? It is only after this question has been posed that a hypothesis can be formulated on how to find the centroid of the triangle in a real-world setting. So I will start to ask myself how and where to find the point that makes for a well-balanced state, perhaps by taking the center points of the sides (*simple natures*) and interrelating them with the corners of the triangle (*simple natures*). According to Hume, this would be "*just*" abstract geometry, it is true, but without procedures like these, architecture would be clueless. Thus, the *question* is the mother of the *hypothesis*, and the *hypothesis* the father of the *experiment*.

The first problem that now arises is that the cherished "data" never present themselves in a "perfect" state in an experiment (which isn't finagled) and, therefore, first need to be reasonably organized. This is what Thomas Kuhn calls "*reasonable agreement*": the interpreting concordance that, in the final analysis, is projected by thinking into the measurement results. But determining what a "*reasonable agreement*" is in turn depends on a great variety of factors, from the cultural background of the respective science, the norms and rules that currently govern scholarly work, the training of the researchers – all of which are subject to historical change.

Therefore, the *reasonable agreement* already is an *interpretation* of the data – which in the example offered by Kuhn are presented in tabular form – that is based on the theory it was actually supposed to modify:

"*We have, that is, said what 'agreement' between theory and experiment must mean if that criterion is to be drawn from the tables of a science text. But in doing so we have gone full circle. I began by asking, at least by implication, what characteristic the numbers of the table must exhibit if they are to be said to 'agree.' I now conclude that the only possible criterion is the mere fact that they appear, together with the theory from which they are derived, in a professionally accepted text. When they appear in a text, tables of numbers drawn from theory and experiments cannot demonstrate anything but 'reasonable agreement.' And even that they demonstrate only by tautology, since they alone provide the definition of 'reasonable agreement' that has been accepted by the profession*."[557]

What we have here is a new variant of the recurrent EAN mechanism of self-deception which makes them believe that they are dealing with the "*given*," with "*matters of fact*," with "*hard data*" and "*measurement results*" where actually there is hypotheses, theories, interpretations, in short, the workings of the understanding, based on the relevant *respect* and *paradigm* of the science:

"*Quantitative facts cease to seem simply 'the given.' They must be fought for and with, and in this fight the theory with which they are to be compared proves the most potent weapon. Often scientists cannot get numbers that compare well with theory until they know what numbers they should be making nature yield.*" (loc. cit., p. 193)

And what is *pure observation* supposed to mean in the above-quoted Wikipedia article? How do you do "pure" observation? This typical EAN self-deception again calls for some comments on a number of important points. Firstly: once you have allowed yourself to become a "slave" – epistemologically speaking – to *sense experience*, you are completely and utterly at its mercy. Therefore, things that due to the available technology have been imperceptible suddenly gain an enormous importance because new technical tools now enable you to "see" them. At the same time, however, there are numerous examples where objects that have always been seen are suddenly seen *differently* because a major paradigm shift has occurred (e.g. sense-experience tells us: "the sun rises"). But the experiment is not conducted outside of a specific cultural and history-of-science context, it is part and parcel of a whole fabric of cultural, scientific, historical, technological, institutional and practical relations that set limits to its orientation and design. Thus, the *experiment* primarily serves to *answer a question* and *test* a hypothesis by using data that have been defined and selected, it is

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[557] Thomas Kuhn, The Essential Tension: Selected Studies in Scientific Tradition and Change. University of Chicago Press, Chicago 1977, p. 185.

*not* simply a means of collecting data at random from "the given", i.e. without a guiding idea.

Collecting data, counting and measuring doesn't make sense unless the *hypothesis* has been formulated, the experimental design is in accord with the question and the hypothesis, the framework has been thought through, the influence of disruptive factors has been anticipated, and many other circumstances have been taken into account through careful *consideration*, *counseling*, *discussion*, and *reflection*. The scientist is not a (data) passive collector but an active (data) hunter. The very term of "*data*" is misleading and a result of EAN's penchant for pseudo-objectivization. For *data* are not an arbitrarily found "*given*," they are measuring outcomes that are related to a certain question, constellation, connection, perspective, as well as dependent on the measuring devices that have been specifically constructed to obtain them. For both of these – the hypothesis as well as the relating of data points to a certain *question* – Henri Poincaré has contributed some valuable clarifications. He first specifies the concept of hypothesis, known since Plato, and subdivides it into several kinds of hypotheses. A first kind is what he calls "*natural*" *hypotheses* which, ultimately, may not be demonstrable with adequate stringency but cannot be really dismissed, either, such as, for instance, the hypothesis that very remote galaxies do not have an influence on us. A second kind is qualified as "*indifferent*" *hypotheses*, that is, hypotheses that introduce a formal element, e.g. a vector. This formal element may be modified as long as one keeps in mind the presuppositions one has started out from. The third kind, then, is those hypotheses that have to be *verified* or *rejected* in the *experiment*, and only these really answer to the concept of hypothesis in the sciences.[558]

With respect to experiments, Poincaré also makes an important point. The *experiment* per se is a major way of obtaining and establishing scientific knowledge but unlike a misunderstanding occasionally found in positivism it is not the final purpose or the "bringer of salvation" as such. For, Poincaré says, there are good and bad experiments:

"*What, then, is a good experiment? It is that which teaches us something more than an isolated fact. It is that which enables us to predict, and to generalise*."[559]

Thus, the aim of *generalization* gains highest priority. What is important is not the data *per se* but, ultimately, the *generalizations generated* from them *by the mind*! For the particular *data* that have been obtained are never independent of a certain context or *respect* but are always put into relation

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[558] Poincaré, Henri, Science and Hypothesis, London and Newcastle-on-Tyne 1905, p. 144.

[559] Poincaré, Henri, Science and Hypothesis, London and Newcastle-on-Tyne 1905, p. 142.

and interpreted, not unlike Thomas Kuhn's "*reasonable agreement*," and are additionally modified in accord with the insight into the overall context:

"*However timid we may be, there must be interpolation. Experiment only gives us a certain number of isolated points. They must be connected by a continuous line, and this is a true generalisation. But more is done. The curve thus traced will pass between and near the points observed; it will not pass through the points themselves. Thus we are not restricted to generalising our experiment, we correct it; …*"(loc. cit., p. 142f.)

Thus, what implicitly directs the experiment is the overall context, the question, the hypothesis, the "*reasonable agreement*" within the ruling paradigm. *What* is data and what is not (Kuhn) is actually, and only, defined by the aim that has been identified in a certain *respect* (Cassirer) that is external to the measuring outcome and determined by the experimental approach alone. If, for example, I propose to measure the fine dust pollution of a street, my focus is on certain particles in a certain *respect* that prompts me to measure the fine dust particles with special instruments and defines the measuring outcomes as *data*. Otherwise, the particles are just dust – if there is no *question* for the experimenter to answer, and no *respect* that serves as a guideline, the data simply turn to dust, as it were. We see that the author of the first Wikipedia article simply failed to understand the nature of the experiment, sticking as he does to the external features, to the "given" that one believes to be collecting while one is actually generating data for data graveyards that nobody is interested in because the questions were irrelevant.

Another data-related problem is addressed by Thomas Kuhn in his epochal work "*The Structure of Scientific Revolutions*":

"*Philosophers of science have repeatedly demonstrated that more than one theoretical construction can always be placed upon a given collection of data. History of science indicates that, particularly in the early developmental stages of a new paradigm, it is not even very difficult to invent such alternates.*"[560]

A very instructive situation has recently arisen in evolutionary biology in this respect. Here a powerful paradigm shift is currently underway, resulting in a situation that Gregory Wray describes as follows:

"*Evolutionary biology is transitioning from an era of data limitation to one of data abundance, and even superabundance, in a limited but growing number of areas. Put simply, the challenge is shifting away from how to gather data and toward how to analyze, integrate, and make sense of very large data sets.*"[561]

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560 Thomas S. Kuhn, The Structure of Scientific Revolutions, The University of Chicago Press (1962) 1996, p. 76.

561 Gregory A. Wray, Integrating Genomics into Evolutionary Theory, in: Massimo Pigliucci, Gerd B. Müller, Evolution – The Extended Synthesis, MIT Press 2010,

In this case, the problem is exactly the other way round: the author argues that while technology today allows us to collect and accumulate enormous quantities of *data* (although the quantitative element should actually be distinguished from the qualitative one since they are not necessarily coextensive), we first need to "*integrate*" these data. But integrate them into what? Into a *theory* that does not even exist at this point! He concludes by saying that we also need to "*make sense of very large data sets,*" that is, give a meaning to these data by putting them into relation to a theory that alone is capable of *making sense* of them. This is a classic example of how "data" simply "don't make sense" without a guiding hypothesis, a theory and a system generated by understanding and reason. And the sense they make does not arise from *sense experience* and *data* but is a product of our thinking, an arrangement thought up and proposed by our mind in a certain respect.

Thomas Kuhn has lucidly described this relation between creative thinking and existing data in the context of the construction of novel theories:

"*More often no such structure is consciously seen in advance. Instead, the new paradigm, or a sufficient hint to permit later articulation, emerges all at once, sometimes in the middle of the night, in the mind of a man deeply immersed in crisis. What the nature of that final stage is – how an individual invents (or finds he has invented) a new way of giving order to data now all assembled – must here remain inscrutable and may be permanently so.*"[562]

Let's now take a look at the second Wikipedia definition: here, the experiment is described as "*a study purposefully designed to test and either verify or reject a specific assumption or conjecture*." That's more to the point, for here the focus is, first, on the testing of a "conjecture," a *hypothesis*. The relevant procedure is "*data collection*," i.e. a systematic testing of the accuracy of the hypothesis "*by purposefully and actively modifying specific conditions of the experimental setup. Active manipulation is an essential feature of the experiment as compared to other methods of data collection*." Although in this definition, too, *thinking* is camouflaged by other terms (actively modifying, active manipulation, etc. – as if thinking, intelligence, was something to be ashamed of!) it is at any rate obvious that all this – the formulation of the hypothesis, the experimental design and its implementation, the test criteria, the elimination of disruptive factors (*biases* and *confounders*), the selection of the evaluation procedure, the data collection

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p. 110. Wray here refers to: R.S. Singh, Darwin to DNA, molecules to morphology: The end of classical population genetics and the road ahead. Genome 46: 938–942.

562 Thomas S. Kuhn, The Structure of Scientific Revolutions, The University of Chicago Press (1962) 1996, p. 89f.

method, the validation, analysis, and evaluation of the data and, finally, their interpretation and publication and the generation of new questions and hypotheses – are acts of *thinking* rather than *collecting*. So, mentioning only data collection among all these activities strikes me as highly reductionist! Furthermore, even with data collection, there is any number of potential mistakes – miscalibrated measuring devices, polluted samples, the wrong kind of test person groups, etc. – that also need to be anticipated and carefully *thought through*.

Along with this problem there is another one that Edgar Wind has highlighted in his classical work "*Experiment and Metaphysics*." In it he demonstrates how approaching the experiment in the EAN way of thinking results in a *circle*. Basically, this is about a version of "Plato's problem" which, here, affects the "collection *method*," namely the *instrument of experimentation*:

"*What is it that an experiment is intended to test? Certainly, it is not meant to decide whether the mathematical demonstration which precedes the experiment has been logically consistent or not, for a test of that kind could be carried out only on mathematical grounds. Neither can it serve to control whether the outcome of the measurement, the coincidence, has been correctly observed or not, for this observation is supposed to answer, not to present, the problem. What is really tested is the physical presupposition on the basis of which the outcome of the measurement has been demonstrated in mathematical terms. This physical presupposition, however, is the very basis on which the measuring instrument has been constructed. If the outcome of the experiment is, therefore, the one that was predicted, if the geometrical demonstration proves to be physically effective, it follows not only that the corresponding physical law must be accepted as actually 'valid', but also that the construction of the measuring instrument must be considered 'correct'. We thus cannot escape the conclusion that the ultimate purpose of the experiment is to test its own presupposition. But we may understand that this perfectly 'illogical' task merely reflects the instrument's meta-logical function – to* register *metrical values by* reacting *to unknown physical causes.*
*In trying to conceive of this function, we must face a startling methodological puzzle. The mere idea of a measuring instrument seems to present a contradiction in terms, inasmuch as it suggests that the* means *of inquiry can be identical with the* objects *of inquiry*."[563]

We cannot escape the *presuppositions* we have always already made because the very construction of the measuring instrument already anticipates the assumed solution and is, therefore, not rigorously objective and free of presuppositions. Wind goes on to describe this description of the circular fix in more detail:

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[563] Edgar Wind, Experiment and Metaphysics: Towards a Resolution of the Cosmological Antinomies, Oxford 2001 [accessed at Google Books, Chapter: The Task of the Experiment].

"*Within this process we can observe how that which we usually call 'fact' is neither ultimate nor immediately given. … The physical fact is registered by an instrument, and instruments are the result on an act of construction. The fact as such, therefore, reflects all the systematic problems of construction … . And in appealing to facts, we unconsciously appeal, whether we admit it or not, to the systems which are responsible for their formulation. But, at the same time, we appeal to something more than that. We appeal to those occurrences which have tested the system; to those incidents in which a physical object that had been endowed with metrical significance lived up, as it were, to the logical standards implied in its metrical endowment. … To call the knowledge of these occurrences 'empirical' (in the sense of something that can be experienced directly) would be absurd. For all that we know of them we know only in terms of the system which we have presupposed.*"[564]

Thus, at any given moment before, during and after the *measuring* of the phenomena, what is naively presented and analyzed as "*matters of fact*" is not only the product of multiple and closely interwoven assumptions, hypotheses and presuppositions but always already part and parcel of a contextual "fabric"; a fact that led Quine to conclude: "*The unit of empirical significance is the whole of science*." (Duhem-Quine thesis)[565] Ultimately, however, a precondition for us to be able at all to follow an *hypothesis*-guided procedure is our innate endowment that Descartes conceived of as *simple natures* and the *natural light*. On all accounts, the experiment is not a generator of directly collected facts, independent, individual *matters of fact* (Hume), but part of a scientific horizon, a scientific context, and of communication and thought processes that are exclusively and at any given moment dependent on and guided by *a priori reason*.

This fundamental EAN error with regard to the *experiment*, that is, their self-concept as collectors of data and sense experiences and, thus, their "enslavement" to *sense experience* has been corrected by Ernst Cassirer as follows:

"*The scientific experiment never makes a simple report regarding the present, momentary facts of perception, but it only gains its value by bringing the particular data under a definite standpoint of judgment, and thus giving them a meaning not found in the simple sensuous experience as such. What we observe, for instance, is a definite deflection of the magnetic needle under certain conditions; what we assert, on the contrary, as the result of the experiment is always an objective connection of physical propositions, which far transcend the limited field of facts accessible to us at a particular moment. As Duhem has admirably explained, the physicist, in order to reach a real result in his investigations, must always transform the actual case before his eyes into an expression of the ideal case, which theory assumes and requires. Therewith the*

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564 Edgar Wind, Experiment and Metaphysics: Towards a Resolution of the Cosmological Antinomies, Oxford 2001/2017, [accessed at Google Books, Chapter: The Task of the Experiment].

565 W.V.O. Quine, Two Dogmas of Empiricism, in: A.P. Martinich (ed.), The Philosophy of Language, Oxford University Press, 2001, p. 57.

*particular instrument before him changes from a group of sensuous properties into a whole of ideal intellectual determinations. It is no longer a definite tool, a* thing *of copper or steel, of aluminum or glass, to which he refers in his assertions; but in its place are concepts, such as that of the magnetic field, the magnetic axis, the intensity of the current, etc., which, for their part, are again only the symbol and husk of universal mathematico-physical relations and connections*."[566]

EAN simply underestimates the forming, questioning, interpreting, projecting, unifying role of the mind that, true to its internal endowment, always already brings, or is bound to bring, order into the sense experiences and "data." This also holds for the scientific experiment, except that, in contrast to our little everyday experiments, it follows a hypothesis-guided methodical order, a test protocol that enables it to generalize what was registered in the individual case. All these achievements cannot be explained by *sense experiences* and their supplement of *associations* of similar or adjacent impressions (Hume), nor by any assembling of *simple ideas* after the "building block principle" (Locke).

"*The characteristic merit of the experiment rests on the fact that it in one stroke establishes a thousand connections. The limited circle of facts, that is sensuously accessible, expands before our* intellectual vision *into a universal connection of phenomena according to natural law. The immediate indications of the moment are transcended on every hand; in their place appears the conception of a* universal order, *of such a sort that it has equal validity in the smallest as in the greatest, and can be reconstructed again from any particular point.*"[567] (my emphases, WW)

The "*intellectual vision*" creates the "*universal order*" that alone decides the position in the system and the worth of a particular point, and not the other way round! Ernst Cassirer's proposition already strongly points in the direction of the visual turn. Noam Chomsky confirms this view and also emphasizes the importance of creativity in contrast to mere data collection:

"*That's one reason why people do experiments. They do experiments to try to get rid of irrelevant phenomena: the point of the experiment is to try to throw out most of the phenomena and discover just those that matter. An experiment is a highly creative act; it's like creating a theory.*"[568]

An interesting variant of *a priori* thinking is the so-called *thought experiment*, and one of its relevant "playing fields" is physics. In his interesting book, "*Die Methode des Gedankenexperiments*," Ulrich Kühne quotes an

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566 Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, p. 280f.

567 Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, p. 281.

568 Noam Chomsky, On nature and language, Cambridge University Press, Cambridge 2002, p. 124.

insight by Max Planck, the founder of quantum physics, who expertly summarized the above considerations:

*The truth of the whole matter is that the inventor of an hypothesis has unlimited scope in the choice of whatever means he may deem helpful to his ultimate purpose. He is not hindered by the physiological tendencies towards constructive picturing which are a feature of the activity of his own sense organs. Nor is he restricted by the guiding hand of his physical measuring gear. With the eye of the spirit he penetrates and supervises the most delicate processes that unfold themselves in the pattern of the physical universe which unrolls before him. He follows the movements of every electron and watches the frequency and form of every wave. He even invents his own geometry as he goes along. And so with his spiritual working-gear, with these instruments of ideal exactitude, he takes a personal part, as it were, in every physical process that happens before him. And all this for the purpose of pushing through these difficult thought experiments – which are a factor of every research process – to the final establishment of conclusions that will be of wide application.*"[569]

It is these "*instruments of ideal exactitude*" that really count, and first of all the *ideal* instrument, the mind that thinks the ideal circle, the atom, the ideal wave, and investigates them with the *eye of the mind*. This is even more obvious for the *thought experiment* which has recently become a subject of heightened interest but, surprisingly enough, is seen as contrasting with the hands-on experiment. This strange predilection for establishing contrasts is due to the fact that most EAN exponents see themselves as "data collectors" who start out from the "given" or the "matters of fact" and believe – just like Locke, Hume, Mach, Carnap etc. did before them – that philosophy and science are about objects, sense experiences and the collecting of measuring outcomes and not essentially about a rational process. Cassirer once more corrects this misconception:

"*For epistemological reflection leads us everywhere to the insight that what the various sciences call the 'object' is nothing given in itself, fixed once for all, but that it is first determined by some standpoint of knowledge. According to the changes of this ideal standpoint, there arise for thought various classes and various systems of objects. … Whatever this objectivity may mean, in no case can it coincide with what the naïve view of the world is accustomed to regard as the reality of things, as the reality of objects of sensuous perception. For the objects, of which scientific physics treats and for which it establishes its laws, are distinguished from this reality by their general fundamental form*."[570]

Cassirer then invokes the concepts of mass and force, atom, electrical potential, or pressure, all of which are not emulations of particular con-

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569 Max Planck, Positivism and External Reality, Part II, in International Forum, 1, No. 2:14–19, 1931, p. 16.

570 Ernst Cassirer, Concepts of Measure and of Things, in Ernst Cassirer, Substance and Function, and Einstein's Theory of Relativity, Chicago; London: The Open Court Publishing Company, 1921, p. 356f.

tents that are "given" through perception. This consideration enables him (by reference to Planck) to come to the pertinent evaluation of the position of the "measuring" done in physics and, actually, in any scientific work:

"*Planck's neat formulation of the physical criterion of objectivity, that everything that* can be measured *exists, may appear completely sufficient from the standpoint of physics; from the standpoint of epistemology, it involves the problem of discovering the fundamental conditions of this measurability and of developing them in systematic completeness. For any, even the simplest, measurement must rest on certain theoretical presuppositions on certain 'principles,' 'hypotheses,' or 'axioms,' which it does not take from the world of sense, but which it brings to this world as postulates of thought. In this sense, the reality of the physicist stands over against the reality of immediate perception as something through and through mediated; as a system not of existing things or properties, but of abstract intellectual symbols, which serve to express certain relations of magnitude and measure, certain functional coordinations and dependencies of phenomena*." (loc. cit., p. 357).

Cassirer then proposes a meaningful ordering, by their true nature, of the roles of hypothesis, thoughts, measuring, instrument, theory, principles, and perception:

"*Everywhere physical thought must determine for itself its own standards of measurement before it proceeds to observation. There must be established a certain standpoint for the comparison and correlation of magnitudes; certain constants must be established at least hypothetically and in preliminary fashion before a concrete measurement can take place. In this sense, each measurement contains a purely ideal element; it is not so much with the sensuous instruments of measurement that we measure natural processes as with our own thoughts. The instruments of measurement are, as it were, only the visible embodiments of these thoughts, for each of them involves its own theory and often correct and useful results only in so far as this theory is assumed to be valid. … It is not clocks and physical measuring-rods but principles and postulates that are the real instruments of measurement.*"[571]

In his book "The Essential Tension: Selected Studies in Scientific Tradition and Change," Thomas Kuhn, too, has dedicated an entire essay to the misconception held by many EAN exponents that laws or theories could be obtained by *measurements* alone. To this end, he uses the description of a standard textbook experiment which suggests that knowledge can be gained from data presented in tables:

"*We are, I suspect, here confronted with a vestige of an admittedly outworn belief that laws and theories can be arrived at by some process like 'running the machine backwards.' Given the numerical data in the 'Experiment' column of the table* (Kuhn here refers to the experiment described in the textbook, comparing the measuring outcomes with those of the experiment; my note), *logico-mathematical manipula-*

[571] Ernst Cassirer, Concepts of Measure and of Things, in Ernst Cassirer, Substance and Function, and Einstein's Theory of Relativity, Chicago; London: The Open Court Publishing Company, 1921, p. 364f.

*tion (aided, all would now insist, by 'intuition') can proceed to the statement of the laws that underlie the numbers.*"[572]

So, if principles and postulates are the real and final measuring instruments, it's no longer surprising that experiments can also be carried out in the mind, that is, "*only*" by thinking. In philosophy, staging thought experiments is, of course, a familiar procedure, just think of Descartes' "evil genius" in the *Meditations*, Plato's "allegory of the cave," or Putnam's "brains in a vat." But in a sense, isn't *any* conscious action of man, except perhaps for certain automated activities such as brushing one's teeth, actually a thought experiment? What is the optimal way of loading the trunk? To figure it out, do I keep stowing and un-stowing suitcases, bags, and Pampers boxes to gain experiences or do I "only" rely on imaginative thinking? Or take preparations for a business negotiation. One goes through it in one's mind: this is how we will open, this is what the opposite party may then do, to which we will respond by a), b), or c). Then we'll wait, which will unsettle them, before we disclose our new price, etc. Nothing in all this is anything to do with sense-experience it is all about "thought experiments," about thinking. A court hearing, a military battle plan, or a financial deal can, thus, be thought through in the mind, opening up novel aspects, revealing weak spots, bringing surprising insights, in short, it is about thinking in variants, about creativity, imagination. James R. Brown, the well-known proponent of the thought experiment, also highlights this aspect of the sudden insight, the Aha! experience, that lets us see the solution to a problem:

"*What the thought experiment does do, however, is give us that 'aha' feeling, that wonderful sense of understanding what is really going on.*"[573]

Of course, there are initial facts – measures, prices, contracts, delivered quantities – that set the framework for one's actions, but they are like the chessmen and the squares of the chessboard, they are the starting points of the game but not the game!

As a conclusion, I'd like to quote a brilliant experiment carried out by the famous genius Ludwig Wittgenstein, one of the shining lights of analytic philosophy:

"*Put two apples on a bare table, see that no one comes near them and nothing shakes the table; now put another two apples on the table; now count the apples that are there. You have made an experiment;* – now the tension reaches its culminating point for

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572 Thomas Kuhn, The Essential Tension: Selected Studies in Scientific Tradition and Change. University of Chicago Press, Chicago 1977, p. 183.

573 James Robert Brown, The Laboratory of the Mind – Thought experiments in the Natural Sciences, Routledge New York/London 2011, p. 7.

the hopelessly antiquated and retarded rationalist! – *the result of the counting is probably 4*."[574] (my parenthesis)

Obviously, there is no end to what we can learn from Wittgenstein, and with so amazing a complexity and depth that we are left speechless!

I'll not go into a more in-depth analysis of the concept "observation" at this point. The problem has been extensively discussed in the literature with regard to positivism's failed attempts to establish *protocol statements* as well as with regard to Popper's *basic statements*. Wilfried Sellars has offered the following enlightening, if somewhat sardonic, comment on the theory of "immaculate" observation:

"*The idea that observation 'strictly and properly so-called' is constituted by certain self-authenticating nonverbal episodes, the authority of which is transmitted to verbal and quasi-verbal performances when these performances are made 'in conformity with the semantical rules of the language,' is, of course, the heart of the Myth of the Given. For the* given*, in epistemological tradition, is what is* taken *by these self-authenticating episodes. These 'takings' are, so to speak, the unmoved movers of empirical knowledge, the 'knowings in presence' which are presupposed by all other knowledge 'in absence' of other particular matters of fact. Such is the framework in which traditional empiricism makes its characteristic claim that the perceptually given is the foundation of empirical knowledge.*"[575]

In the final analysis, it has been made quite clear that completely isolated, theory-neutral facts cannot be obtained by observation alone, as Pierre Duhem had already argued. Every *observation*, every finding, is always already "*theory-laden*." In his book "*Grundzüge einer Philosophie der Wissenschaften bei Ernst Cassirer,*" Karl-Norbert Ihmig offers an instructive overview over different kinds of "*theory-ladenness*." He first states that "theory-ladenness" does not mean that every experiment must be preceded by a theory but that "*experiments are oriented to models and progressively gain shape due to the interrelations between mental images or schemata and their material constructions*." In this, the relations between theories and models are not necessarily linear. Then, there is the role of devices and measuring instruments that, in turn, "*presuppose comprehensive theoretical knowledge*." Furthermore, quantitative determinations are always established in relation to "*certain respects or dimensions*" that again presuppose certain theories. This is illustrated by certain scores or scales based on standard measures that, again, presuppose a theory and a validation. Ihmig further refers to methodical analysis procedures that can never be theory-independent, and, finally, to "*considerations in terms of group theory, the*

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574 Ludwig Wittgenstein, Remarks on the Foundations of Mathematics, Oxford 1978, I, 37, p. 51.

575 Wilfried Sellars, Empiricism and the Philosophy of Mind, Harvard University Press 1997, p. 77.

*formation of invariants, and symmetry considerations.*" Ihmig finally calls to mind that Cassirer's central theory-of-science argument used to be that the particular never appears as a particular in the experiment but is always registered and understood within the framework of the universal.[576]

A comprehensive evaluation of the *problem of observation* and the subsequent aporia and failures in Carnap and the Vienna circle can be found in Herbert Schnädelbach's "*Erfahrung, Begründung und Reflexion – Versuch über den Positivismus*"[577] as well as in Kurt Walter Zeidler's "*Prolegomena zur Wissenschaftstheorie*."[578] So I don't feel the need to engage in a more detailed exposition, aside from the fact that it would also go beyond the scope of this book. It is this problem that subsequently led Thomas Kuhn to introduce the aspect of the *paradigm*, thus enhancing the "*theory-ladenness*" of scientific observations – whose "*mind-ladenness*" had already been described by Plato, Aristotle, Descartes, Leibniz, Kant, and Hegel – by adding the aspect of "*history- und culture-ladenness*." At any rate, scientific *observation* is nothing to do with the *retinal image* that Descartes noticed when considering the staring eyes of the dead animals he obtained from his butcher for his studies of the pathways of the optical nerves, and that Frege occasionally referred to when he wanted to appear particularly objective and fact-based.

**Conclusion**:
Let's now come to a conclusive assessment of *empiricism*, with a special focus on the three core theses of the empiricist doctrine that I have presented in the beginning and that are the reference points also for analytic philosophy and naturalism:

1. The *theory of ideas* in Locke and Hume, that is, the mode of cognition of an allegedly fixed "*given*" that is supposed to *passively* imprint itself in the form of *simple* and *complex ideas* onto the empty *dark cabinet* or *tabula rasa* of the mind.
2. The *denial of innate knowledge*, or the *a priori*, if one prefers, which will be discussed in some detail in a later chapter.
3. The desperate attempt, doomed to fail from the very start, to directly obtain *universal* and, what is more, *abstract* concepts from the *simple ideas* of the "inner film" and even form theories on the basis of these impressions.

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576 Karl-Norbert Ihmig, Grundzüge einer Philosophie der Wissenschaften bei Ernst Cassirer, Darmstadt 2001, p. 34–47.

577 Herbert Schnädelbach, Erfahrung, Begründung und Reflexion – Versuch über den Positivismus, Frankfurt/Main 1971.

578 Kurt Walter Zeidler, Prolegomena zur Wissenschaftstheorie, Königshausen & Neu-mann, Würzburg 2000.

I propose to carry out this conclusive assessment in the words of Günter Gawlick, an expert in empiricism. For once, this is an expert who is not embedded in the Anglo-American language area and is, therefore, less subject to the "bite inhibition" that seems to hamper the authors previously quoted. In his monograph "*Empirismus*" (part of the series "Geschichte der Philosophie in Text und Darstellung"), he comes to the following conclusion:

"*At this point, the question of the success of empiricism inevitably arises. The attempt to make do entirely without any a priori guidelines of cognition obviously does not produce the desired results but has come up against a number of objections. (…) All our cognition, the empiricists say, derives from experience. But what is experience? (…) Experience can, on the one hand, be seen as the sum total of what, under normal conditions, is observed and described in simple words. But on the other, it can also be conceived of as the passive reception of impressions that precedes any activity of the understanding. In both cases, what is meant is the registering of particulars, but while in the first case a certain order is already implied, in the second case there is only disordered manifoldness. We can say: the less a priori guidelines, the more pressing the charge of explication; the more radical the empiricism, the greater its difficulties. The situation is the same if we say that all our cognition is based on the given. What, then, is the given? Is it perceptions? The latter tend to be complex and are only subsequently broken down into their elements by the understanding. Or is it some absolutely irreducible units, atoms, as it were, of intuition? These cannot even be described, for describing them would already imply something universal, the concept, which the mind, according to the presupposition, does not yet have. And can the mind form concepts by examining, comparing and ordering the manifold of intuition if it does not yet have at least the concept of resemblance? Nor does speaking of the 'simple facts of experience' help, for it is highly doubtful whether it is possible for simple facts to exist at all independently of any theory. The empiricists say that at the first stage of cognition, the mind is entirely passive: it simply absorbs the sensual ideas. Locke, being well aware of the significant role of attention even in the simplest perception did note that this is just a methodological fiction but failed to draw any conclusion from this fact. All the classical empiricists discounted the activity of the mind; therefore, much remains unclear in their writings. This is especially obvious in Hume who, by his own admission, is unable to explain the structure of our perceptual world without permanently relying on the fictions of the imagination.*"[579]

Gawlick then addresses the dubious position of geometry and mathematics in empiricism:

"*There is one field where empiricist are especially hard put: their thesis that all our cognition derives from experience has always been opposed by the mathematicians who have never let themselves be dissuaded from considering their science as entirely independent of perception, not only with respect to the origin of mathematical concepts but also with respect to the validity of mathematical theorems.*" (loc. cit.)

[579] Günter Gawlick (ed.), Empirismus, Geschichte der Philosophie in Text und Darstellung, Stuttgart 2005, p. 15–19.

However, Günter Gawlick does acknowledge the value of "*empiricism as a method*" or, in Kant's words, as "*a maxim for moderating our claims*," and also points out that empiricism's long-term survival was due to its "*symbiosis with the natural sciences*." Referring to a *scientific attitude* rather than an "empiricist method" would be much more acceptable in this case, for as we have shown, the entire theoretical-methodological framework of empiricism has turned out to be untenable. A *science-affine attitude* is much more in line with the program established by Descartes in terms of the step-by-step expansion of our knowledge along the guidelines of *simple natures* and the *natural, innate light*, or by Kant in terms of the "*guidance of reason*." Finally, Gawlick comes to the conclusion:

"*Empiricism as a system that claims to derive all our knowledge from experience and to reconstruct our world from the given and without a priori premises has failed: this claim is untenable*." (loc. cit.)

This final verdict about empiricism is now the ideal starting point for the next steps, that is, an exploration of what today's science, i.e. *vision science*, really understands by "sense experience." First of all, it will be shown HOW visual perception really happens – a final farewell, once and for all, to the entirely wrong empiricist assumptions regarding the purely passive reception of sense experiences: perceptual atoms, *tabula rasa*, *impressions* and *sensations*, simple and complex ideas, corpuscles emitted by things, camera obscura and dark cabinet, photographic plates, washed-out copies dimly copied as an inner film – in short, the entire EAN doctrine of "sense experience."

### 3. "Vision Science" and the fall of empiricism's doctrine of perception

What I cannot and will not do in this chapter is discuss the entire range of anatomical, physical, neurophysiological und cognitive knowledge that is involved in *vision science*. While this would go far beyond the scope of this book, there are excellent standard works on all of this, notably "*Eye and Brain*" by Richard L. Gregory, "*Vision Science*" by Stephen Palmer, "*Visual Intelligence – How We Create What We See*" by Donald D. Hoffman or „*Visuelle Wahrnehmung*" by Jörg Sczepek.[580] My principal aim here is to give an overview over those new insights, gained during the last decades, that have completely changed the conventional understanding of percep-

[580] Richard L. Gregory, Eye and Brain, The Psychology of Seeing, Princeton University Press, Princeton and Oxford 1997; Stephen E. Palmer, Vision Science, Bradford MIT Press, Cambridge London 1999; Donald D. Hoffman, Visual Intelligence – How We Create What We See, New York 1998; Jörg Sczepek, Visuelle Wahrnehmung, Norderstedt 2011.

tion, and to reflect on the new philosophical constellations and insights to which they have given rise. I then propose to show how rationalism – and in part also Neo-Kantianism – is strengthened and confirmed by these new insights while the flawed and scientifically unsound epistemic claims of empiricism and naturalism are largely confuted. Perception is, of course, not restricted to *vision*, and any discussion of it would obviously have to include acoustic and tactile perception as well as the other types. But since the focus of philosophical debates has always been on visual perception (with the exception of Berkeley who, in spite of his intense preoccupation with *vision*, assigned the highest priority to the sense of touch[581]), and since about half of our brain's capacity is taken up by the processing, or "computation," of *vision*,[582] I feel justified in focusing on visual perception. There also is a number of interesting studies on musical perception in early *gestalt theory*, for instance by Max Wertheimer, but all this would clearly go beyond the scope of this book.

But before delving into the vast expanses of *vision science*, I would like to once more recapitulate the respective positions held by EAN in order to make quite clear, by way of contrast, the divide that separates the assertions – *arbitrary*, *unfounded* and *repetitive* to the point of imposing themselves as facts – made by empiricism, analytic philosophy and naturalism, on the one hand, from current evidence-based scientific knowledge, on the other. As we have already shown in the above, "*sense experience*" is posited as the *only* basis of *all* our knowledge by empiricism, but also EAN in general. Up to the late 20th century, it was further assumed that knowledge arose from the *sensations* or *impressions* that imprint themselves in a purely *passive* and *direct* manner on the initially *blank slate* of the mind. This imprint was, then, supposed to produce accurate images in the *camera obscura* of the mind, which will somehow be transformed into *objects*, *representations* and even *abstract concepts*, starting out from *simple* and *complex ideas*, with *complex ideas* being built from *simple ideas* (which are conceived of as something like "sense atoms"). In this, it is *simple ideas* only that are supposed to be retained, as washed-out but otherwise exact *copies*, by the impressions. Evidence for this line of reasoning can be found in the writings of Locke and Hume for *empiricism*, Bertrand Russell and Ludwig Wittgenstein for *analytic philosophy*, and W.V.O. Quine for *naturalism*. But let's start with the development of the new scientific findings in vision science

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581 See George Berkeley, A New Theory of Vision and Other Select Philosophical Writings, (1910) Forgotten Books 2012.

582 Ken Nakayama, Zijiang He, Shinsuke Shimojo, Visual Surface Representation: A Critical Link between Lower-level and Higher-level Vision, in: Stephen Kosslyn, Daniel Osherson (Eds.), Visual Cognition, Vol 2, Bradford Book MIT 1995, p. 3.

*David Marr*, a mathematician and psychologist who unfortunately died much too early of leukemia, was the pioneer in this field. In the 1970s, he published the first programs in neuroinformatics and the first computer-assisted mathematical models of *vision*. He summarized the findings from these first pioneering works in his posthumously published book "*Vision*."[583] At the time, researchers were very surprised to find that even the first cautious approaches to the basics of the actual process of vision, the first tentative models, formulas, algorithms and computer simulations, turned out to be so highly complex, bewildering and surprising that they produced not answers but lots and lots of new problems and questions. Thus, before anything else, a number of fundamental functions needed to be defined and understood, such as, for instance, the role of surfaces and edges in the field of vision, the transformation of the two-dimensional upside-down field of view projected on the retina into the three-dimensional right-way-up image, stereoscopic binocular vision, object constancy, etc. Ken Nakayama et al. describe this situation as follows:

"*One of the most striking things about our visual experience is how dramatically it differs from our retinal image. Retinal images are formed on the back of our eyeballs, upside down; they are very unstable, abruptly shifting two to four times a second according to the movements of the eyes. Moreover, retinal images are sampled very selectively; the optic-nerve fibers that send information to the brain sample more densely from the central area than from peripheral portions of our retinae. Yet, the visual scene appears to us as upright, stable, and homogeneous. Our perception is closely tied to surfaces and objects in the real world; it does not seem tightly related to our retinal images*."[584]

So, there is a first cautionary insight: the simple and naïve assumption that the "retinal image" that results from a direct imprint of an image on the retina is a one-to-one copy of our "visual image" is completely wrong. The purely physical part of our "visual image" – waves, corpuscles, photons – ends at the receptors of the retina. From then on, these physical elements need to be biochemically encoded, passed on and processed for any cognitive operations and interpretations to be possible at all.[585]

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583 David Marr, Vision: A Computational Investigation Into the Human Representation and Processing Of Visual Information (1982), The MIT Press, Cambridge/London, 2010.

584 Ken Nakayama, Zijiang He, Shinsuke Shimojo, Visual Surface Representation: A Critical Link between Lower-level and Higher-level Vision, in: Stephen Kosslyn, Daniel Osherson (Eds.), Visual Cognition, Vol 2, Bradford Book MIT 1995, p. 1.

585 Marr, D., & Hildreth, E.C. (1980). Theory of edge detection. Proceedings of the Royal Society of London, B, 207, 187–217; Marr, D., & Nishihara, H.K. (1978). Representation and recognition of the spatial organization of three-dimensional shapes. Proceedings of the Royal Society of London, 200, 269–294; Marr, D., & Poggio, T. (1979). A computational theory of human stereo vision. Proceedings

But even the very first or, in terms of perceptual technique, most primitive operations of this transformation are not steps in a linear or monocausal process in terms of a stimulus-response model but a succession of highly complex, *interpretatively* and selectively prepared computations. So, it didn't take long for the question to arise whether these interpretations and transformations were the work of some higher cognitive functions – what Kant might have called a "figurative synthesis" – or were located at a more elementary level. Since the transformation of the object into its "visual image" could obviously not happen in terms of a direct one-to-one copy process, more and more indications were found that some interpretative processes must already be at work at a very basal level:

"*Our view is that such inferences are embedded in the visual system and can occur at surprisingly early stages almost independent of our knowledge about familiar objects.*"[586]

But apart from these basic interpretational processes, it is first of all the "inverse problem" that keeps bothering information scientists even today and has brought about a fundamental change in thinking in *vision science*. For even the physical information can never be *unequivocally* determined because what the eye perceives on a straight line of sight is likely to comprise a multitude of objects, or points of light, in various distances and constellations. This means that, in purely physical terms, there is much more to "see" (actually, an endless number of possibilities!) than what could be captured by a purely copy-like, monocausal model. And yet the human brain, by a kind of interpretative "likelihood estimate" and in a matter of split-seconds, is able to filter out, from the abundance of information that keeps streaming in along these lines of sight, the scene that is most likely the right one as well as the constellation and distance of objects. This achievement is so highly complex that even cutting-edge computer programs are as yet unable to accomplish it with a comparable degree of efficiency. Thus, even today, and in spite of the exponential growth in knowledge in the fields of information science and technology, a comprehensive solution of these problems is still some way off. Brian Scholl, speaking of "*The impossibility of visual perception*," explains this fact as follows:

"*Visual perception is the process of recovering useful information about the structure of the world, based on the shifting patterns of light that enter the eyes. Perhaps the most*

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of the Royal Society of London 204, 301–328; Marr, D., & Ullman, S. (1981). Directional selectivity and its use in early processing. Proceedings of the Royal Society of London B, 211, 151–180.

586 Ken Nakayama, Zijiang He, Shinsuke Shimojo, Visual Surface Representation: A Critical Link between Lower-level and Higher-level Vision, in: Stephen Kosslyn, Daniel Osherson (eds.), Visual Cognition, Vol 2, Bradford Book MIT 1995, p. 2.

*fundamental fact about visual perception is that this task is, strictly speaking,* impossible. *That is, the shifting patterns of light that enter the eyes* are insufficient by themselves to fix the structure of the external world from which that light was reflected or emitted *(Marr, 1982), because there are always a multitude of possible structures in the world that could have given rise to those same patterns of light.*"[587] (my emphases, WW)

This summarizing insight by a leading scientist in the field of perception and cognition constitutes in itself both a total refutation of the entire empiricist-naturalist model of visual perception as a "copy-like process" – which, while it may have the advantage of a certain simplicity, still has the disadvantage of being completely wrong – and a reaffirmation of rationalist epistemology: the *sense experiences* that come streaming in are as such quite unable to produce, by a direct copying mechanism (Hume), an *unequivocal* representation of the structures of the external world. "Direct" perception (as they like to call it in EAN, but also in realism) or the simple *stimuli of the retina* (Quine, Frege) can never *analogically*, *unequivocally* and *completely* represent the exact structure of *reality*. Some *interpretation* and *preparation* of these sense experiences by innate functions, or learned functions that build on them, is always needed for a meaningful "*visual image*" to form at all. But since the EAN doctrine defines *sense experiences* as the sole basis of all knowledge, and unless one constructs a comprehensive set of subterfuges such as those offered by the analytic philosophy of language, this EAN doctrine is a failure from the very start. And this is true even though at this point in our reasoning, all we have is a first broad and general assessment of *vision*, while the enormous complexity of the various functions and visual processes involved in the process of object constitution has not even been touched upon. Scholl goes on to say:

"*In this sense the visual system must solve an 'inverse problem', which is technically not possible via deductive inference. This underdetermination is most commonly appreciated in the case of depth and three-dimensional shape. A given patch of retinal stimulation, for example, could correspond to an object in the world of almost any size (since a small nearby object will create the same retinal image as a larger object further away) and almost any shape… Such dilemmas of underdetermination are in no way specific of depth perception but hold for almost every aspect of visual processing*" (loc. cit.).

From a philosophical point of view, the first crucial element of this statement is its emphasis on "*underdetermination*," that is, the "*poverty-of-the-stimulus*" constellation that was also the starting point for Noam Chom-

[587] Brian Scholl, "Innateness and (Bayesian) Visual Perception," in: Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford University Press, Oxford/New York 2005, p. 40f.

sky's theory of *universal grammar*. The second element is that it was not until the 1980s that it began to dawn on EAN proponents that the visual process *definitely* did not and could not consist of the *simple*, *analogical*, *linear*, *passive copying* of *sense experiences* as suggested by Locke's *camera obscura* or that sort of *mirror* of nature that is generated by Hume's washed-out copies, supposed to somehow copy the facts of reality; that, in contrast, it is a highly complicated *interpretative*, *transformative* and *constructive* process where the signals received from the environment are reconstructed according to certain *patterns* – more on this later – from the most primitive to the most complex levels. Ernst Cassirer's observation, cynical in appearance but only too true, that it was the misery of *empiricism* that the very progress of the empirical sciences was continually eroding its systemic basis, has become a reality:

"*Thus it was empirical psychology itself which gradually shattered the psychological empiricist's dream of understanding the reality dissolving it into its ultimate sensory elements, the original data of sensation. These data have proved to be hypostases – so that the theory which seemed destined to ensure the victory of pure experience over mere constructions, of sensation over the abstract concept, actually contains an unmistakable and irreducible residue of conceptual realism. Thus once again the 'matter' of reality seems to slip through our fingers as it were, just as we are about to seize it.*"[588]

We will later see that this also applies to the debate about innate knowledge. The new insights of *vision science* offer not only a scientific refutation of EAN dogmas, they also are a broad confirmation of the perspective of gestalt psychology – which, therefore, I propose to call *gestalt theory* because it clearly goes beyond the field of psychology in this respect – as well as *rationalism*. For while EAN philosophers have for centuries kept preaching the erroneous, passive mode of a purely reproductive perception, René Descartes was not only the first to publish the physical *law of refraction*, and to describe the way light rays travel in a number of optical instruments, and to conduct a – largely neglected – scientific study of the entire geometry of vision, his *Optics*, which remains basically valid even today. He was also the first scientist and philosopher to realize, in the context of his reflections on the problem of *size constancy* and *object constancy*, the "*impossibility of visual perception*" referred to above. In the course of his scientific geometrical studies, he not only realized that our mind does not just copy an object and that certain scientific and geometrical facts preclude the very possibility of any such copying, but that the size and distance of the object – something that is artificially kept constant, that is, *constructed* by the mind – needs to come as a supplement to mere "*sense experience*."

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[588] Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 34–35.

"*We do not see the distance, we imagine it (imaginer)…*"[589]

Descartes' philosophical conclusions in his theory of visual perception were thus based on concrete scientific studies rather than vague conjectures or "one-man self-observations" à la Hume. The *Optics* famously open with the following statement that mainly refers to Descartes' own scientific studies on lenses and telescopes:

"*The conduct of our life depends entirely on our senses, and since sight is the noblest and most comprehensive of the senses, inventions which serve to increase its powers are undoubtedly among the most useful there can be*."[590]

Whoever reads this can see for himself that the alleged vilification of sensual perception by rationalism is a legend that EAN dogmatics have worked hard to keep alive notwithstanding the fact that *rationalism* has always affirmed the relevance of sight as an important, if primitive, *starting point* for thinking.

So, to once more document the EAN stance, here's a short list of ideal-type statements by EAN philosophers concerning the mode of perception:

*Empiricism* – John Locke:
"*These* simple Ideas, *when* offered *to the mind, the Understanding can no more refuse to have, nor alter, when they are* imprinted, *nor blot them out, and make new ones in itself, than a* mirror *can refuse, alter, or obliterate the Images or Ideas, which, the* Objects set before it, do therein produce. *As the* Bodies that surround *us, do diversly* [sic!] affect our Organs, *the Mind is forced to receive the Impressions; and cannot avoid the Perception of those Ideas that are annexed to them. (…)* For in bare naked Perception, the Mind is, for the most Part, only passive*; …*" (my emphases, WW)
"The Senses *at first* let in particular Ideas, and furnish the yet empty Cabinet*: And the Mind* by degrees growing familiar with some of them, *they are* lodged in the Memory, *and* Names go to them." (my emphases, WW)[591]

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589 Paul Natorp, Descartes' Erkenntnistheorie, Eine Studie zur Vorgeschichte des Kri-ticismus, Marburg 1882, p. 133.

590 René Descartes, Optics, in René Descartes, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 152.

591 John Locke, An Essay Concerning Human Understanding, Oxford World's Classics, Oxford University Press 2008, II.i.25; II.ix.1, p. 63; 82; and I.ii.15, p. 23.

*Empiricism* – David Hume:
"When I shut my eyes and think of my chamber, *the* ideas *I form are* exact representations *of the impressions I felt;* nor is there any circumstance of the one, which is not to be found in the other."[592] (my emphases, WW)

"*… we shall here content ourselves with establishing one general proposition,* that all our simple ideas in their first appearance are deriv'd from simple impressions, *which are correspondent to them, and which they exactly represent.*" (loc. cit., p. 9; my emphases, WW)

This clearly spells out the process of perception as conceived of by empiricism: there is the passive mind that is described as a dark and empty cabinet, and there are the impressions of the surrounding objects (!) that imprint themselves on it and that the mind, which cannot but receive them such as they stream in, *exactly* (!) copies.

*Analytic philosophy* – Bertrand Russell:
"*We may call the two places the* active *and* passive *places respectively. Thus in the case of a perception or photograph of a star, the* active *place is the place where the star is, while the* passive place *is the place where* the percipient or photographic plate *is. … (p. 180) Thus what may be called subjectivity in the point of view is not a distinctive peculiarity of mind*: it is present just as much in the photographic plate. *And the* photographic plate *has its biography as well as its* 'matter'."[593] (my emphases, WW)

"Thus the *sense-data* that make up the appearance of my *table* are things with which I have acquaintance, *things immediately known to me just as they are.*"[594] (my emphases, WW)

*Analytic philosophy* – Ludwig Wittgenstein:
"*2.151 The form of* representation *is the possibility that* the things are combined with one another as are the elements of the picture.
*2.1511 Thus* the picture *is linked with* reality*;* it reaches up to it.
*2.1513 According to this view the* representing relation *that makes it a picture, also belongs to the picture.*
*2.1514 The representing relation consists of the coordinations of the elements of the picture and the things.*"[595] (my emphases, WW)

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592 David Hume, A Treatise of Human Nature, Oxford University Press 2007, 1.1.1, p. 8.

593 Bertrand Russell, The Analysis of Mind, London: G. Allen & Unwin: New York: Macmillan 1922, p. 180f.

594 Bertrand Russell, The Problems of Philosophy (1912), Seven Pleasures Publications 2009, p. 32.

595 Ludwig Wittgenstein, Tractatus logico-philosophicus: German and English, Routledge 1981, p. 39.

"What holds *the bundle of 'sense impressions'* together is their mutual relationships. *That which is 'red' is also 'sweet' and 'hard' and 'cold' and 'sounds' when one strikes it.* In the original language-game with these words it isn't 'This looks red' but 'This is red' *(hard etc.).* Our *agreement is essential to the language-game.*"[596] (my emphases, WW)

*Naturalism* – W.V.O. Quine:
"Two cardinal tenets of empiricism *remained unassailable, however, and so remain to this day. One is that whatever evidence there is for science is* sensory evidence. *The other, […] is that* all inculcation of meanings of words must rest ultimately on sensory evidence. […] *But why all this creative reconstruction, all this make-believe?* The stimulation of his sensory receptors is all the evidence anybody has had to go on, ultimately, in arriving at his picture of the world."[597] (my emphases, WW)

"*One is taught so to associate words* with words and other stimulations *that there emerges something recognizable as talk of things,* and not to be distinguished from truth about the world."[598] (my emphases, WW)

"… *so 'Red', under the usage which I am now imagining, is the appropriate remark on the occasion of those distinctive* photochemical effects *which are* wrought in one's retina by the impact of red light. This time society's method of training consists in rewarding the utterance of 'Red' when the individual is seen looking at something red, and penalizing it when he is seen looking at something else."[599] (my emphases, WW)

"*It is important to think of what prompts the native's assent to 'Gavagai?'* as stimulations and not rabbits. Stimulation *can remain the same though the rabbit be* supplanted by a counterfeit. (…) *A visual stimulation is perhaps* best identified, *for present purposes*, with the pattern of chromatic irradiation of the eye."[600] (my emphases, WW)

So far for documenting the fact that the starting point for EAN is a more or less explicit theory of a *direct*, *analogical copying* process based on the *sensual stimulation of the retina*, of *impressions* that are *passively* received in the *analogical* mode of a *photographic plate*, which copies are then *associated with the appropriate words, learned by training*. We have understood a rabbit when we can analogically combine the stimulus (!) emanating from the surface of a rabbit, or even just a counterfeit rabbit, with the

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596 Ludwig Wittgenstein, Remarks on the Philosophy of Psychology, Oxford 1980, Vol. I, p. 158e.

597 W.V.O. Quine, Epistemology Naturalized, in W.V.O. Quine, Ontological Relativity and Other Essays, New York and London, Columbia University Press 1969, p. 75.

598 W.V.O. Quine, Word and Object, The MIT Press 2013, p. 23.

599 W.V.O. Quine, Word and Object, The MIT Press 2013, p. 5.

600 W.V.O. Quine, Word and Object, The MIT Press 2013, p. 27.

word rabbit that we have learned by drill. Ernst Cassirer took the opportunity to comment on Russell's theory of the photographic plate accordingly (with explicit reference to the passage quoted above):

"*We cannot compare perception to the reception of light by a photographic plate and the development of an image that is exclusively determined by the light falling on the plate. Only in rare exceptional cases, under artificial conditions of 'reduction', does this ever happen. There seems to be no stage, however 'primitive', of perception, at which perception constantly reacts to the 'same' stimulus by producing the 'same' sensation.*"[601]

There obviously is so much *naïve realism* in all of this that it keeps popping up in Russell's reflections in spite of his efforts to keep it at bay. As a last contribution to the issue, here's a quotation from *Kurt Koffka*, one of the founders of gestalt psychology, who also dealt with the metaphor of the *photographic plate* but came to a completely different conclusion:

"*If you want a picture you must have the plate in a camera that is well focused. But even if you have taken a regular picture, what is on your developed plate? A picture? Yes and no; yes, when you include the person who looks at the plate in the situation, but no, if you consider the plate by itself. On this plate you have a great number of particles which, before the plate was developed and fixed, were sensitive to light and were affected according to the intensity of the light which struck them… But, however fine its grain, the developed plate can be adequately described if you divide it up into small areas and measure the thickness of the layer in each of these areas. A complete table of these thicknesses would be a complete description of the developed plate. There is no picture on it, if we mean by picture more than this complete table.*"[602]

Of course, from a naturalistic point of view, there is a two-dimensional, inverse und upside-down stimulation pattern that is in some ways similar to the pattern of the impressions on the photographic plate. But even the activity of the receptors, let alone all the subsequent transformations, is already "completely different" from what is posited by naïve realism, or EAN. Koffka comes to the conclusion:

"*But apart from this difference the immediate cause of our vision of any object is just such a mosaic of stimulation as that of the photographic plate. And that raises at once the problem: how the enormous richness and variety of our visual behavioral environment can be aroused by such a mere mosaic of light and shade and colour.*"[603]

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601 Ernst Cassirer, The Concept of Group and the Theory of Perception, Philosophy and Phenomenological Research, Vol. 5, No 1, Sept. 1944 (translated by Aron Gurwitch), p. 1.

602 Kurt Koffka, Principles of Gestalt Psychology, Mimesis International (Routledge 1935), p. 74f.

603 Kurt Koffka, Principles of Gestalt Psychology, Mimesis International, Routledge 1935, p. 75.

Nor did Russell's theory of visual perception and the naively realistic copy doctrine underlying it go unnoticed by Ernst Cassirer. He discussed it in his 1927 essay "Erkenntnisfragen nebst den Grenzfragen der Logik und Denkpsychologie," where he basically noted that the "photographic plate" was probably quite good at representing something but was unable to "*say the significant word 'I' to itself.*"[604]

Koffka, breaking free of the naïve copy mechanism of the empiricist dogma and, not unlike Chomsky's later rethinking in the field of language, arrived at a much more adequate understanding of the facts as early as in the 1930s. The characteristic feature here is a "poverty-of-the-stimulus" situation similar to the one that prevails in language acquisition. The equivocal, scattered, fleeting, flickering physical information on our retina is much too scarce to allow for the forming of "visual texts" that are complete, meaningful and, what is more, *unequivocal*. We therefore need to rely on an interpretative "visual grammar" that is permanently at work and whose processing involves an enormous amount of brain activity; which explains why the visual processing and reconstruction of the physical impulses takes up almost half of our entire brain capacity. It also explains why our ancestors' brain volume was clearly relatively large even before they had the faculty of speech: they needed it to be able to handle not only the processes of seeing but of *visual thinking*, as well! So, step by step, we begin to see the implications of the "poverty-of-the-stimulus" argument and feel the need to further explore what *vision* really means, unhampered by the misconceptions of empiricism, naturalism, materialism and realism.

Moreover, what is also needed, and what we will deal with in a later chapter, are the processes that organize the field of vision according to the laws of *gestalt theory* that have developed on top of the merely reflexive adaptations of the visual system, for instance to a sudden incidence of light. These are highlighted by Wolfgang Metzger in the classic work "Laws of Vision. Referring to a question first raised by Max Wertheimer[605] – why, when looking out the window, we cannot see the 327 levels of brightness and color hues that the painter had to put on the canvas in order to reproduce the sight – Metzger asks:

"*Why do the 327 spots separate into precisely 3 entities of, for example, 120, 90, and 117 spots (i.e., into house, trees, and sky), instead of 2 entities of 150 and 177 spots or 7 entities of 6 times 50 and 27? (…) The articulation of the perceived world into*

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604 Ernst Cassirer, Erkenntnisfragen nebst den Grenzfragen der Logik und Denkpsychologie, in: Ernst Cassirer, Aufsätze und kleine Schriften, Gesammelte Werke, Hamburger Ausgabe, Meiner 2004, p. 37ff.

605 Max Wertheimer, Untersuchungen zur Lehre von der Gestalt, Festschrift für Carl Stumpf, Psychologische Forschung, Berlin 1923. Wolfgang Metzger here refers to the introductory example in Wertheimer's famous publication.

*house, tree, and sky is especially adaptive for us living creatures; no other segmentation of the visual world would allow us to find our way so effortlessly around in our environment. But the utility of our perceptual representation does not explain anything, it rather deepens the mystery: because you don't often get something in this world just because you need it. The greatest thinkers have occupied themselves with this question without solving it. After Berkeley and Hume, the issue was addressed principally by Kant in the fundamental part of the* Critique of Pure Reason *entitled 'Transcendental Analysis', especially in the second paragraph of the second major part* 'On the a priori bases of the possibility of experience' *in which 'experience' is intended to mean nothing other than information about things and events around us and in ourselves, regardless of how it comes to us. To find the proper answer to this question we must seek the limits of experience*."[606]

This observation by a proponent of *gestalt theory* raises an important question: where does the reach of the purely physiological perceptual processes end, defined as they are by the anatomical capacities of the visual organs, by reflexes and automatic adaptation, and where do the laws of *gestalt theory* begin to work, that is, the *cognitive* processes that organize and structure what is perceived, as well as the *conscious representational knowledge* of objects, the subsuming of what has been seen under *concepts* and, beyond that, the understanding of their *functions*? For our present purpose, let's skip the first part of these considerations – for instance, that a sudden flash of intense light makes you automatically close your eyes – because it belongs to the realm of physiology, as well as the third part, that is, the subsuming of things and thoughts that are already "formed" as gestalts under schemata and concepts because this will be discussed in the chapter on Kant. The second part of the question, however, highlights an unclear and somewhat confusing situation because certain gestalts can also be ambiguous (as in the rabbit-duck illusion that Wittgenstein reflected on, or Rubin's famous 1921 picture "vase/two faces") and are already structured by the empirically proven laws of gestalt. This results in a certain interference with Kant's "*productive imagination*" that clearly is both an innate faculty and a mental activity, whereas the laws of *gestalt theory* are largely to do with *innate*, "automatic" cognitive functions. This complicated question will be discussed in the chapter on Kant, as part of an effort to further explore the limits of this, in Kant's words, "*hidden art in the depths of the human soul*."

However, these primary physiological functions – ensuring that the perceived visual image is not upside-down, that we can recognize colors and shades of grey, that the two-dimensional image is transformed into a three-dimensional one – are (*and this could actually serve as an EAN defense line*) biological functions that might "automatically" work to simply and naturalistically transform the retinal image into the "visual image." In

606 Wolfgang Metzger, Laws of Seeing, Cambridge, Mass., MIT Press. 2006, p. 41.

this case, there would be a retinal image R, i.e. the stimulus pattern that is physically transformed on the retina from the incoming rays of light, and a visual image V that would be the result of an analogical, biological-cognitive transformation of the stimulus patterns on the retina. This would imply that the upside-down image, for instance, is inversed and the lateral reversion corrected and that depth of focus, object constancy and other parameters are automatically adapted one-to-one. Thus, perception would be *naturalized* as a *copying* process, and the two-dimensional physical "retinal image R" would be identically transformed into the "*visual image V*" in a *biological-naturalistic* way. All we need to do, then, to fully restore the EAN doctrine and salvage the one-dimensional machine-person, is attach the name to the V picture that is suggested by the language we have acquired by inculcation and training ("Dressur"). But artful as it may be, this rescue attempt is again doomed to fail because the transformation of the retinal image into the visual image is not a *linear* and *analogical copying* process such as, for example, the simple analogical operation of a pocket calculator. It is an interpretative probabilistic process that relies on the "retinal image R" to produce a probable *best possible interpretation* "visual image V." Depending on the viewer's situation, experience, background knowledge and a number of other factors, the retinal image can in principle result in an *infinite number* of visual images, that is, R can become V1, or V2, or V3, …V infinite. And this is the very reason why, quite apart from the *interpretative nature* of the concept formation level, this ultimate EAN rescue line will inevitably fall short since what we have here is an "interpretative constructive" rather than "physical analogical" transformation of the retinal image.

Classical empiricism has, at any rate, sought to avoid being concrete in this respect. While Descartes studied the processes of vision mathematically and scientifically in his *Optics* and conducted multiple sections and anatomical studies of eyes and brains in the course of his scientific exploration of the visual process, Hume preferred to be on the safe side by immediately shifting these very real and difficult problems on to other sciences:

"*The examination of our sensations belongs more to anatomists and natural philosophers than to moral; and therefore shall not at present be enter'd upon. And as the impressions of reflection, viz. passions, desires, and emotions, which principally deserve our attention, arise mostly from ideas, 'twill be necessary to reverse that method, which at first sight seems most natural; and in order to explain the nature and principles of the human mind, give a particular account of ideas, before we proceed to impressions. For this reason I have here chosen to begin with ideas*."[607]

[607] David Hume, A Treatise of Human Nature, Oxford University Press 2007, I.i.2, p. 11.

Hume thus tried to evade both the responsibility of being the one who made *sense experience* the pivotal point and basis of his system and the task of demonstrating *HOW*, given the method he suggests, sense experience is supposed to ever develop into abstract concepts. But if all ideas are the exact copies of impressions (images) that are supposed to be vivid and intense while he apparently doesn't care to know what it is that causes these immediate and vivid impressions (namely objects, as Hume states elsewhere), he might as well have stayed with Berkeley's subjective idealism, in the first place. In the passage quoted above, Hume tries to strategically eliminate the problem by alternating between copy-like *representation* and *impression*. Pretending to be unable to be more specific about impressions, a subject he is moreover happy to leave to the anatomists and the natural sciences, he takes the copy-like *representations* as a starting point for his studies with the alleged aim of proceeding from copy-like representations to impressions but, then, *never does so* in all of his work! He keeps speaking of objects – apples, horses, tables, rooms – but fails to specify the source or origin of the respective impressions and to decrypt or untangle the *causal* (!) *connection* that is supposed to exist between the real objects and the vivid and strong sense impressions, on the one hand, and the copied ideas or impressions, on the other. For as we have pointed out before, causality is what he must at all costs steer clear of since it would disrupt all of his life's work as a skeptic. Norman Kemp Smith, having seismographically retraced Hume's alternation between *naïve realism* (objects simply exist and are copied) and a *theory of ideas* (ideas is all we know), highlights

"*…the naively realist manner in which Hume employs the terms 'impression' and 'idea' as if they were interchangeable with terms that signify independently existing bodies. He even goes so far as to speak of impressions as acting on sense-organs (I, iii, 1). How is this usage to be understood? Is it due merely to carelessness and inadvertence? Or is it deliberately adopted, as a temporary concession to ordinary modes of speech, to be later withdrawn?*"[608]

We are once more confronted with the "carelessness" that seems occur often in English empiricists and allows them to gloss over or excuse what actually are systemic flaws. But here we can no longer let Hume get away with it since what he sees as the strong point of his philosophy, triumphantly brandishing it against idealist or rationalist philosophy, is that his philosophical and scientific claims can be directly *verified* by the *sense experience of real objects*. Which is also why he recommends committing the books of rationalists and idealists to the flames since they allegedly fail to meet this ultimate test criterion:

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[608] Norman Kemp-Smith, The Philosophy of David Hume, Palgrave Macmillan 2005 (1941), p. 113.

"'*Tis easy to see, why philosophers are so fond of this notion of some spiritual and refin'd perceptions; since by that means they cover many of their absurdities, and may refuse to submit to the decisions of clear ideas, by appealing to such as are obscure and uncertain. But* to destroy this artifice, *we need but reflect on that principle so oft insisted on,* that all our ideas are copy'd from our impressions. For from thence we may immediately conclude, that since all impressions are clear and precise, *the ideas, which are copy'd from them, must be of the same nature, and can never, but from our fault, contain any thing so dark and intricate. An idea is by its very nature weaker and fainter than an impression; but being in every other respect the same, cannot imply any very great mystery*."[609] (my emphases, WW)

So, triumphantly posing as the victor, Hume plunges into his own sword which, "carelessly" again, he has left lying about. For seeking to shirk the responsibility of explaining the *origin* of sense experiences, he proposes to discuss only their faint copies. But he cannot introduce the imagined success criterion and "*destroy this artifice*" of rationalism without claiming that the ideas thus produced can be verified by confronting them with *reality*, that is, the real source of the impressions. We have already shown that for Hume, these impressions, these *sense experiences*, are *images* that can be "*exactly*," if in a somewhat washed-out fashion, "copied." But here he specifies and reaffirms that all our impressions = copies = images = ideas are necessarily *clear and precise*.

This proves, firstly, that Hume really refers to *clear and precise copies* of *reality*, for otherwise, this verification criterion would be meaningless and in no way superior to the alleged artifices of rationalist philosophers. It proves, secondly, that what is important here is the *clarity* and the *precision* of the visual images that are supposed to be perceptions of the real objects such as they are in themselves, such as they are "*given*." Thus, while what is important in Descartes is the *clarity and distinctness of thinking*, for instance when differentiating between the two ideas of the sun, where the first, sensory one is obviously wrong with respect to the size of the sun and only the second one, being the result of astronomical calculations, is correct, what is important in Hume is the clarity and precision of the visual image, that is, the surface-based perception, which thus qualifies, in Hume and in EAN, as a means of epistemic verification – the basic criterion! Descartes is also much more lucid in reflecting that things may even be completely different from what they appear to be:

[609] David Hume, A Treatise of Human Nature, Oxford University Press 2007, I.iii.1, p. 52.

"*They may not at all exist in a way that exactly corresponds with my sensory grasp of them, for in many cases the grasp of the senses is very obscure and confused. But at least they possess all the properties which I clearly and distinctly understand, …*"[610]

Thirdly, Hume's *naïve realism* can no longer be denied, it has been too clearly articulated, just as it has ultimately been internalized by Locke, Gassendi and actually keeps surfacing in G.E. Moore and Russell, as well. So, this important point being established, let's return to the physical retinal image and the stimulus pattern on the retina. For it is this actually rather simple EAN world of *analogical* perception, *clear and precise representation* and "*exact*" copies that was disrupted by David Marr's bioinformatics models. *There simply is no such thing as a direct copying process*! But this is, of course, only the first step of an insight that will lead us far, far away from empiricism of whatever kind and towards size constancy, object constancy, color vision, and much else. And even if we were ready to accept empiricism's flawed and superficial conception of image formation, we would still know nothing about the *function* of things even though *function*, rather than the superficial image or the dummy of a rabbit we "see," is obviously the essential element for us to understand a thing and form its concept.

After these introductory and preparatory considerations the time has come to attend to the incredible transformations and interpretations of "reality" that characterize the operations of "*vision*." To this end, I propose to follow the very instructive, well-rounded and substantially state-of-the-art standard work of Richard L. Gregory, "Eye and Brain." Strategically speaking, Gregory is an optimal source for my purpose for a number of reasons. Firstly, he is embedded in the Anglo-American science and philosophy and can hardly be accused of being "continental" in his philosophical leanings, or otherwise corrupted by idealism. He clearly states his commitment to empiricism and yet his book – and this is what makes it so interesting – offers an argument, on virtually every other page, that is diametrically opposed to, if not fit to reduce to absurdity, the assumptions and dogmas of EAN that he sets forth. Nevertheless, on the very first page, Gregory's study of vision opens with some observations that indeed make you prick up your ears:

"*The eye is a simple optical Instrument. With internal images projected from objects in the outside world, it is Plato's cave with a lens. The brain is the engine of understanding. There is nothing closer to our intimate experiences, yet the brain is less understood and more mysterious than a distant star. … Optical images were unknown before the tenth Century, and not until the start of the seventeenth were images discovered in*

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[610] René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 55.

*eyes. At last it became clear that light does not enter or leave the brain, locked privily in its box of bone. All the brain receives are minute electrochemical pulses of various frequencies, as signals from the senses. The signals must be read by rules and knowledge to make sense. ... This is far beyond the common account that the eye is a camera; … It is the uncamera-like features of eyes and brains that most interest us here. What is striking is the huge amount of brain contributing to vision, giving immense added value to the images of the eyes. Where does this extra richness for vision come from? By some authorities it is simply denied — they see perception as passive acceptance of what is out there, as a window facing the world. But this does not begin to explain how we see objects from the sketchy images of the eyes, even from sparse lines and crude dots of seemingly inadequate pictures. Prediction has immense survival value. It not only makes fast games possible in spite of the physiological signal delays from eye to brain and brain to hand. Anticipating dangers and potential rewards is essential for survival – made possible by buying time from seeing objects distant in space.*"[611]

Thus, on the very first pages, *Richard Gregory* addresses a number of fundamental points that open up a new world and bring some intelligent light into Locke's dark and empty cabinet! First, having firmly stated that perception is *nothing* to do with a "*camera obscura*," which was the very term used by Locke in his "*Essay*," he asks what could be the source of the additional extra *richness* of *vision* as compared to the physical information the eye actually receives. This is strongly suggestive of the "*poverty-of-the-stimulus*" argument set forth by *Noam Chomsky* in his "*Rules and Representations*" (1980). Chomsky had, after all, started out from the question of how it is possible for a rich and grammatically correct language to emerge at all from the relatively limited amount of verbal input that is actually received, and for children (even those with speech-impaired parents) to develop and use, in the most diverse situations, a grammatically correct mother tongue they have never before experienced. Mastering this situation can only mean that there is an innate structure to rely on, that is, universal grammar.

In line with the insights of neuroinformatics and the computer models of vision, Gregory also emphasizes that the incoming impressions *alone* could never account for normal human perception. Rather, the physical retinal image is something like a *hypothesis*, an indispensable starting point for perception, but nothing more. Just as with language and, ultimately, every mental achievement that builds on physical input, it is the brain's creative action, that is, its *interpretation* and *reconstruction of what is perceived* that is now at the fore. There's no getting around the fact that this achievement is only partly due to *sense experience* and that the latter is just the starting point for image formation but *never* the *final result*. Gregory

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[611] Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 1f.

then undertakes an assessment of the major 20th-century "theories of perception" from a present-day perspective. He first targets *behaviorism* which, given J.B. Watson's claim that thinking is nothing but "*internal sotto voce speaking*" and nothing to do with mental imagery, has already struck us as particularly crude. Gregory makes short shrift of this obsolete position: "*This has not worked out*" (loc. cit., p. 3). But let's not forget that behaviorism used to be very predominant in the 20th century and for quite a time succeeded in marginalizing some much more intelligent positions such as Neo-Kantianism or gestalt theory. Today it's no big deal to say that behaviorism has become, but think of Wittgenstein, Ryle, etc.

As for the genuinely *empiricist theory of visual perception*, i.e. *structuralism*, Gregory doesn't even bother to examine it in any detail, while *Stephen Palmer* offers at least some historical references in his monumental textbook "*Vision science*." Palmer notes that this empiricist theory of visual perception is primarily due to the German researcher Wilhelm Wundt and that its main feature is *atoms* of perception which, being the ultimate indivisible unities of *sensory perception*, are supposed to make up the content of experience. The close affinity of this theory to Locke's *sensations* and Hume's *impressions*, which in turn can be traced to the materialists' corpuscular theory and, ultimately, the ideas proposed by Democritus and Epicurus, is rather evident. Here again, of course, the problem soon arose of how these perceptual corpuscles, or atoms, are supposed to become a *gestalt*. But this, it was argued, could be mended the Humean way:

"*The 'glue' that holds sensations together in more complex percepts was thought to be associations resulting from their spatial and temporal contiguity in the past. As this description of structuralism implies, both atomism and empiricism lie at the heart of structuralist theory. …Without the benefit of new scientific insights, structuralists attempted* to translate the philosophical views of the British empiricists more or less directly into the emerging discipline of psychology."[612] (my emphasis, WW)

As an effort to put into practice the philosophical doctrine of *English empiricism* in a one-to-one fashion, the empiricist theory of perception did not live out its first contact with reality. The result was a downfall so complete that today's textbooks don't even bother to mention it, a fact I tend to see as a wonderful confirmation of the previous analyses of empiricist epistemology. It perfectly illustrates how the very flaws that we have criticized in so much detail in our discussion of Locke and Hume – *simple ideas* and *complex ideas*, *association* (contiguity! – see the above quotation), assemblage theory and all the other completely unsustainable *empiricist* pipe dreams – are indeed completely impracticable and, once put to

[612] Stephen E. Palmer, Vision Science, Bradford MIT Press, Cambridge London 1999, p. 50.

the test of scientific practice, can only be discarded. Thus, Locke's and Hume's epistemological concepts are revealed to be the very type of self-generating "figments" and fanciful fictions that empiricists used to – falsely – attribute to rationalism and idealism. Analytic philosophy had better not be so patronizing, invoking unicorns and Pegasuses to demonstrate the nature of idealisms' alleged figments. As far as figments go, all they need to do is look at the very assumptions made by Locke and Hume; which, after all, are nothing less than the EAN starting point and basis!

A rather different approach is offered by *James J. Gibson* in his theory of visual perception. During his military service in the U.S. Army Air Force, Gibson studied the conditions for the observation of aerial views and landscape formations to be at all possible. Having realized that observation does not proceed mechanically and camera-like, but that there is a close relation between the perceiving organisms and their specific environment that strongly influences this type of perception, he turned against the prevailing tenets of behaviorism and the stimulus-response theory. Perception, for Gibson, is an interaction that is strongly influenced by biologically relevant environmental factors such as the surface structure, medium, texture, light conditions of the formations observed, and in which the position of the observer or the concerns of the observing organism are much more important than the purely physical mechanisms. In his much-quoted book "*The Ecological Approach to Visual perception*" he states:

"*The very notion of an image as a flattened-out object, a sort of pancake of a solid body, is shown to be misleading. It begins to appear that most of what has been written about pictures and images over the centuries is misleading, or hopelessly vague. We should forget it all and start fresh. The information for the perception of an object is not its image. The information in light to specify something does not have to resemble it, or copy it, or be a simulacrum or even an exact projection. Nothing is copied in the light to the eye of an observer ...*"[613]

"*The information for the perception of an object is not its image*" (…) "*It begins to appear that most of what has been written about pictures and images over the centuries is misleading, or hopelessly vague. We should forget it all and start fresh*" … – this rejection of the empiricist copying theories of visual perception gets right to the core of the matter. But in spite of his very creative focus on the environment of the perceiving person and the rejection of the crude copy theory of empiricism, Gregory could not accept the modern theory of vision: "*Gibson's essentially passive account is very different from the notion … that perceptions are constructed hypotheses*." James Gibson subscribed to a form of realism that assumed that all of the

[613] James J. Gibson, The Ecological Approach to Visual Perception, Psychology Press Taylor & Francis, New York 1986, p. 304f.

information needed for the process of cognition was given in the distal input, a view that essentially failed to gain acceptance. In his mathematically elaborate work "The Geometries of Visual Space," Mark Wagner offers the following modern-day assessment of this approach:

"*The first conclusion that presents itself from the data discussed in this book is that visual space is not the same as physical space. Despite of the claims of Gibsonian Naive Realism (Gibson, 1979), our perceptions often do not match physical reality under very ordinary circumstances. Even under full-cue, naturalistic conditions, distance, area, angle, and volume judgments are transformed by power functions that generally do not have exponents precisely equal to 1.0. In addition, the in-depth dimension of visual space typically evinces an affine transformation relative to the frontal dimension. Under reduced-cue settings (which generally occur at least once a day in the natural world), these distortions are even more pronounced.*"[614]

It is safe to say, therefore, that the view often found in the writings of realistic authors such as Bertrand Russell or James Gibson, i.e. the so-called "*direct*" perception of reality, can be considered over and done with and ready to be banished into the realm of "wishful thinking" and unscientific legend. Mark Wagner goes on to say:

"*Secondly, the human mind is flexible enough and the world provides enough variation that no single geometry can fully encompass human visual experience. We can think of distance as the crow flies, as route distance, and as an artist would paint it. We can take into account the laws of perspective or ignore them. …* Even if the physical world produced a single image in the mind, the geometry of that image changes when people place a different metric on it."

Wagner emphasizes that not even the simplest objects can be unequivocally and directly "mirrored":

"*Even looked at physically, a flat piece of paper can host an infinite set of geometries; it is only forced to be Euclidean when distance is defined in a Euclidean way. The human mind can quickly shift from one metric to another just as we can shift the forward face of a Necker Cube with a small mental effort, and with each shift in metric, a new geometry applies to visual space.*" (loc. cit.)

Thus, not even the observation of the *simplest objects* such as, for instance a piece of paper, is consistent with the naïve notion of "*direct*" perception – modern science of vision simply puts an end to *direct* perception of whatever kind.

In contrast, after decades of quasi-oblivion during which it was upstaged for a number of reasons both historical and cultural, a very different theory has made a glorious comeback: the *gestalt theory* of perception. Gestalt psychology originated in Berlin in the early 20th century as the

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614 Mark Wagner, The Geometries of Visual Space, Psychology Press, New York/Hove 2012, p. 223.

school of *Max Wertheimer*, *Kurt Koffka*, *Wolfgang Köhler* and *Kurt Lewin*,[615] although a prefiguration of the concept of gestalt had already been proposed by *Christian von Ehrenfels* some 20 years earlier, as well as in some reflections on the subject published by *Karl Bühler* at the turn of the century. In the 1920s and 1930s, the school of gestalt theory set forth a comprehensive theory of vision and perception. It was based on scientific experimentation that involved test persons, series of tests and sophisticated experiments and was the first theory to actually understand and conceptualize vision as an *active* process dedicated to the framing and shaping of the physical input. Another topic of interest for gestalt psychology was gestalt perception in music and in touch. But the majority of the school's proponents were Jewish, which meant that they had to flee the rising terror of the Nazi regime, primarily by emigrating, when possible, to the United States. There they could go on publishing, but due to language barriers and the prevalence of the EAN dogma they were never duly received and assimilated and were seen as more or less exotic. After 1945, the gestalt theory of perception was perpetuated and further elaborated by Wolfgang Metzger – who had stayed in Germany –, for instance in his work "Laws of Seeing."[616] "*Gestalt*" is best defined as the "product of organization,"[617] that is, as the *organization of the field of vision* according to certain laws (similar to *grammar*). The guiding principle of gestalt theory is that *the whole is always more than (i.e. different from) the sum of its parts*. This implies that our vision is not determined by atoms or impressions of perception but that it is the other way round: the individual elements of the field of vision are always *a priori* organized and structured in the imagination by the forms or *gestalts of perception*.

The present-day theory of vision, refined by the insights of informatics and neuroinformatics, has basically adopted and – taking account of the experiences with computer-generated perception algorithms – even enhanced and refined most of the reasoning and the approaches of *gestalt theory*. It was the very experiences made with the respective computer programs that led to the crucial paradigm shift from an empiricist to a rationalist view of perception, from the "*copying*" of reality to its cognitive *interpretation*, *reconstruction* and *organization*, based on *innate laws*. Stephen Palmer defines this modern scientific view of visual perception as follows:

"*In one way or the other, our visual system must be contributing information to that contained in retinal images – even dynamic ones – to arrive at the single most likely*

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615 See e.g: Wolfgang Köhler, The Definitive Statement of the Gestalt Theory, Liveright Publishing, New York 1992 (1970).

616 Wolfgang Metzger, Laws of Seeing, Cambridge, Mass., MIT Press. 2006.

617 Kurt Koffka, Principles of Gestalt Psychology, Mimesis International, Routledge 1935, p. 682.

*possibility from among the logically infinite number of solutions to the inverse problem. (…) This proposal is usually called the* likelihood principle*. It is a* probabilistic view of perception *in which the visual system is hypothesized to compute the* interpretation with the highest probability *given the retinal stimulation.*"[618] (my emphases, WW)

All the points previously referred to are in this definition, from the *poverty-of-the-stimulus* approach to the selection of the most likely visual image among the virtually infinite number of possibilities afforded by the retinal image to the probabilistic concept of the *hypothesis*-guided, interpreting perception which filters out the *most likely* visual image from the retinal image that served as the basis for Frege's and Quine's world of thought.

However, Palmer's modern-day approach does differ somewhat from Gregory's approach and from that of gestalt theory. Gestalt theory is based on a number of empirically proven and reasonable laws of perception, namely the assumption that the visual system, partly due to innate biological principles and partly due to patterns learned with time or to *innate* patterns that have been refined through application, seeks to obtain the *simplest* or *most ideal organization of the field of vision* (what Wertheimer called the "*good gestalt*"), while Palmer's more scientistic theory of vision is conceived of as a *probabilistic construction, by principles of Bayesian statistics, of the reality-to-be-perceived*. But both agree on what it is, from an evolutionary point of view, that enables us to "see," namely the lightning-fast generation, by a priori given functions, of the most likely scenario from the virtually infinite possibilities that are afforded by the physical image on the retina. But Bayesian statistics, while a highly interesting probability algorithm, do come with a number of problems in this context. In my view, they are a most recent, and desperate, attempt by "die-hard" empiricists to simulate "cumulative" learning, that is, a continuous accumulative process of learning from "experience" by a succession of minimal steps. As such, Bayesian statistics are extremely interesting and highly successful in certain fields such as, for instance, Internet search engines and, even more recently, cancer research where it serves to calculate the probability of tumor mutations. From the accumulation of millions of mouse clicks, Bayesian-type programs are able to step-by-step identify and "learn" certain behavioral patterns of the users of a website. They can also be very useful in the cognitive sciences and vision science.[619]

But we still need to keep in mind that the understanding of and insight into *new* knowledge is actually not obtained this way but by an intu-

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618 Stephen E. Palmer, Vision Science, Bradford MIT Press, Cambridge London 1999, p. 56f.

619 Kersten D., Mamassian P., Yuille A., (2004) Object perception as Bayesian inference, Annual Review of Psychology, 55: 271–304.

itive, sudden insight, or "aha! experience," rather than millions of iterations with minimal increments in knowledge. Grasping something means understanding the essence of a problem, the principle as such, so as to be able to apply it again and again. I grasp the Pythagoras' theorem once I have understood the logical core of the proof, not by *inspecting* a right triangle thousands of times from varying perspectives. Human beings do not analyze 100 million clicks over 10 months in order to grasp the essence of an unknown figure they encounter in the forest. On the contrary, this insight needs to be gained very quickly, and in this respect, a Bayesian-type program or anything in the way of Bayesian statistics is clearly too slow and, therefore, biologically inappropriate. This is also why it is most unlikely for the laws of vision to be built on the model of probabilistic-statistical systems rather than innate laws of gestalt. The claim that we "learn" from experience in the way these computer programs do is just another encroachment of empiricism on things that are beyond its very definition. For strictly speaking, empiricism's understanding of experience applies to copied *sensations* only, as we have repeatedly pointed out in the above, and from *sensations* per se nothing at all can be learned, as our discussion of Locke and Hume has shown. The only way for humans to learn is through *rational insight* based on the organizing and structuring arrangement of sense experiences and the grasping of their structures and relations, and what is commonly called *experience* results from this multitude of mental "leaps," insights and reflections. Experience in this sense is the result of transcending thinking rather than an accumulation of sense experiences. Moreover, conceiving a statistical program and applying it to make a computer *simulate* cognitive processes and, thus, produce continuous increases in knowledge is not at all the same thing as figuring out a problem by insight based on innate faculties.

One of the core problems of Bayesian programs, at least as an empiricist rescue strategy, is that due to its systemic construction, the origin of the previous information that leads to the next step cannot be logically explained. With simple processes such as the successive mouse clicks on various websites, the individual click is easy to identify and quantify as exactly one click. But with learning processes that involve quantitative and *qualitative* elements this is much more difficult, and the origin of the basic elements is an open question. In the reader "The Innate Mind," Brian Scholl illustrates the problem with respect to the perception of lighting which living beings on this planet tend to automatically expect to come from above. As a result, we perceive concave and convex curvatures in a diametrically inversed fashion; but if one simply turns the image upside down, this perception is always inversed, which is due to the innate assumption that lighting comes from the sun, that is, from "above." These

are assumptions, or "*priors*," that no Bayesian-type program can produce. But where, then, do these *priors* come from? Brian Scholl explains:

"*Many priors may be innate. This has been empirically demonstrated in some cases (e.g. the overhead-illumination principle; Hershberger 1970) and is widely assumed in many others – including the visual system's prior assumptions that objects are rigid (Ullman, 1979), that objects are convex (e.g. Hoffman & Richards 1984), and that motion is relatively slow (Weiss et al., 2002). In general theorizing beyond the scope of particular priors, moreover, most Bayesian theorists are happy to accept the possibility that 'the priors are in the genes' (Kersten et al., 2004, p. 285).*"[620]

I believe that to enable successful vision, evolution has not endowed the brain with a mathematical-statistical probability calculus but, rather, with specific and, from an evolutionary perspective, "successful" genetic, or innate, *patterns* such as the *laws of gestalt* that afford a maximum chance for homo sapiens under practical conditions of use. It wouldn't surprise me at all if these structures included the perception of, for instance, objects as whole entities, simple Euclidean figures, movement as a priority feature, the figures of dangerous animals or the spontaneous differentiation between individual animals and groups of animals. Therefore, gestalt theory is more consistent with *evolutionary biology* while perceptual algorithms based on Bayesian statistics (such as those used by search engines) are useful for neuroinformatics computer programs. The dynamic process of image generation by probabilities has also been called a *heuristic interpretation process*:

"*The process is heuristic because it makes use of probabilistic rules of the thumb that are usually, but not always true. If these underlying assumptions are false, they will lead to erroneous conclusions in the form of visual illusions. (…) The hidden assumptions made by the visual system are many and varied.*"[621]

Moreover, most optical illusions do not operate once in a while but *invariably*, and do so even if one already knows the mechanism underlying the illusion, which also tends to invalidate a purely probabilistic mode of perception in favor of a mode of perception by rules based on *innate laws of gestalt*. With this, we have reached a very important point in our argumentation, so it may be in order to briefly point out the philosophical consequences of the modern scientific theory of *vision*. Stephen Palmer combines the insights of gestalt theory with those of modern science (he himself has discovered three new laws of gestalt) whereas Gregory is more concerned with the philosophical and evolutionary-psychology aspects of

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620 Brian Scholl, "Innateness and (Bayesian) Visual Perception," in: Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford University Press, Oxford/New York 2005, p. 49.

621 Stephen E. Palmer, Vision Science, Bradford MIT Press, Cambridge London 1999, p. 57f.

gestalt theory. But even though his tone in the relevant passages remains rather restrained, Stephen Palmer's reflections in his phenomenal "*Vision science*" where he combines cutting-edge science with gestalt psychology suffice to reveal the poverty and *indefensibility* of the empiricist theory of "*sense experience*" as the sole basis of perception. For he quite clearly and literally speaks of a *heuristic process of interpretation* where the retinal *stimuli* are actively interpreted with a certain *degree* of *probability*, and images of "objects" are *constructed* accordingly. So this is not about the *passive copying* of some "*given*" *sense experiences*, *simple ideas,* nor about *sense atoms*, but about an *active preparation* of images which do rely on the physical retinal stimuli but are themselves only "*best guesses*," heuristic *processes of interpretation* that reconstruct or, rather, *interpret* the perceptual image by relying not on fixed patterns but (as Palmer argues) on *probabilities*. This is also the reason underlying the many optical illusions that Palmer and Gregory document. A very comprehensive and instructive presentation of optical illusions and the underlying interpretive mechanisms of vision is offered in "Illusionen des Sehens" by Thomas Ditzinger.[622]

These insights of the modern theory of vision could hardly be more radically different from the assumptions, claims and approaches of *empiricism*. But let's briefly recall what rationalism, vilified and ostracized in the 20th century, has taught us: the senses, and more particularly sight, are indispensable in life but, as *Descartes* argued following *Plato*, may also deceive us, and what can be deceptive is not fit to serve as a basis for the *certainty*, *universality* and *necessity* that is required for science. Knowledge can only be grounded in our *natural light*, our *innate understanding* and our natural *innate reason*, and never in *sense experience* alone because we can only build on what reason has accepted as clear and adequately differentiated in its clearness, as for instance in geometry. Today it is clearly understood that even in the most trivial case, sensory perception itself is a result of *interpretations*, *reconstructions*, *innate laws of gestalt*; and, also, that it may often be an *illusion*. What empiricism takes to be the "given," the starting point of all knowledge, is always already *a priori interpreted and reconstructed* even at the perceptual level and before the conceptual level is attained at all! I can't imagine a more unequivocal refutation of the assumptions of empiricism, or stronger confirmation of those of rationalism. Just think of the Wittgenstein quote at the beginning of this chapter:

"*What holds the bundle of 'sense impressions' together is their mutual relationships*."[623]

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622 Thomas Ditzinger, Illusionen des Sehens, Heidelberg 2014.

623 Ludwig Wittgenstein, Remarks on the Philosophy of Psychology, Oxford 1980, Vol. I, p. 158e.

In the light of modern vision science, the absurdity of this claim by Wittgenstein, the shining light of linguistic-analytic philosophy, becomes even more evident. The rays of the – Hume-inspired – *bundle of sense impressions* are supposed to be held together, not by the multiple interpretations and the processing and organizing operations of vision but inversely, positivistically, by their mutual fixed (realistic) relationships! This primal misconception that provides the basis for the EAN understanding of the process of vision will entail many more new findings, each of which will invariably do just one thing, namely reduce EAN beliefs to ever more absurdity. And at this important turning point, let's not forget that the downfall of the sensualist dogmas of empiricism, of "*sense experience*," "*the given*," the "*stimulus patterns of the retina*," the "*copy theory*," is also the downfall of all the similarly naïve beliefs held by *naturalism*, *materialism* and *realism*. It furthermore entails the need to reconsider possible epistemological implications this rejection of the "*given*" as the starting point of knowledge has for Kant's *Critique of Pure Reason*.

*Gestalt theory*, in contrast, has shown to be clearly consistent with Neo-Kantianism, for instance in *Hans Cornelius*[624] or *Richard Hönigswald*,[625] and to have integrated many ideas and elements of Kantian provenience. According to his cousin Kurt Goldstein (as Guido Kreis points out), Ernst Cassirer was clearly inspired by gestalt theory and its concept of "*Prägnanz*" when he developed his concept of "*symbolic pregnance*":

"*By symbolic pregnance we mean the way in which a perception as a sensory experience contains at the same time a certain nonintuitive meaning which it immediately and concretely represents*."[626]

This definition of symbolic pregnance is already very close to that of visual thinking, for the *sensory experience* is conceived of as directly linked to a *nonintuitive meaning*. However, as John Michael Krois observes,[627] this

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624 Hans Cornelius, Psychologie der Erfahrungswissenschaft, Leipzig 1897. Cornelius also offers an early discussion of "gestalt qualities," cf., for instance, p. 164ff.

625 R. Hönigswald writes: „However, the size-defined, that is, natural object is a 'whole' only insofar as it is also understandable in terms of extension, that is, insofar as it is *gestalt*. ... And just as the natural object is ‚gestalt', an ensemble of natural objects is *system*." Richard Hönigswald, Grundfragen der Erkenntnistheorie, Hamburg (Meiner) 1997, p. 237.

626 Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 202.

627 John Michael Krois, Problematik, Eigenart und Aktualität der Cassirerschen Philosophie der symbolischen Formen, in: Hans-Jürg Braun, Helmut Holzhey und Ernst Wolfgang Orth (eds.), Über Cassirers Philosophie der symbolischen Formen, Frankfurt/M. 2016, p. 23.

meaning may be a mythical, esthetic or scientific one whereas *visual thinking* in its proper sense takes place at a visual-symbolical-logical level. Everything beyond this level will always be *mediated* rather than *immediate*.

For Cassirer, "symbolic pregnance" does not go beyond Kant's critical limit but is directed against the bad immediacy of empiricism:

"*Let us, for example, consider an experience from the optical sphere. Such an experience is never composed of mere sensory data, of the optical qualities of brightness and color. Its pure visibility is never conceivable outside and independently of a determinate form of vision; as sensory experience it is always the vehicle of a meaning and stands as it were in the service of that meaning … Thus this process shows from a new angle how the analysis of consciousness can never lead back to absolute elements: it is precisely the pure relation which governs the building of consciousness and which stands out in it as a genuine a priori, an essentially first factor. … Here we feel the true pulse of consciousness, whose secret is precisely that every beat strikes a thousand connections No conscious perception is merely given, a mere datum, which need only be mirrored; rather, every perception embraces a definite 'character of direction' by which it points beyond its here and now*."[628]

For Cassirer as for gestalt theory, "*the whole is always more than (i.e. different from) the sum of its parts*," and the multitude of individual sense experiences can never account for the way these sense data are organized in a certain *respect*, while the *here* and *now* in the above quotation might even be construed in terms of the "Sense-Certainty" of Hegel's "Phenomenology of Spirit." In his grandiose study on Cassirer, Guido Kreis notes that besides gestalt theory, Cassirer very concretely referred "*to a central element of the B deduction of the Critique of Pure Reason, namely that 'all synthesis, through which even perception itself becomes possible, stands under the categories' (CPR B 161).*"[629] Thus, Kant's starting point – that the laws that guide the organization of the chaotic *sense experiences* of the *manifold* are provided by our imagination-aided understanding and that sense experiences alone can never self-organize into objects; that our reality is *actively* constructed by our understanding – is in principle also present in Helmholtz, Cassirer and gestalt theory. The basic idea invariably is that we do not derive our knowledge, our concepts, from copied things but that, inversely, it is we that impose the laws on things; which, in the realm of perception, involves a schematic-interpretive process while in the realm of the understanding, the process is a rule-based lawgiving one (by Kantian categories). Pretending that the said theories are directly derived from Kant would be an overstatement, but from a broader per-

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628 Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 200 and 202f.

629 Guido Kreis, Cassirer und die Formen des Geistes, Frankfurt am Main 2010, p. 249.

spective, they are certainly in line with his approach and, in principle, also that of Descartes. Nevertheless, we still need to go slowly and take care to distinguish between what is to be understood as the innate automatisms of image formation in humans from what Kant conceives of as the organization in terms of a "*figurative synthesis*," the hidden art of *schematism* and the *subsumption* under concepts. Both processes are similar in principle but are located at different "levels" of the perceptual process. This being said, there are several passages in Wolfgang Metzger's book where he clearly states that he is being guided "*by Kant's thought*," first of all concerning the "'forms of intuition' (…) the dimensions of extension in time and space, as well as the inner cohesion and *continuity of individual things, their form, and their behavior; all their relationships including the relationship of cause and effect, in other words everything without exception must arise anew in us during perception, and this can occur only because the potential for it is innately present in us.*"[630] Yet he also goes beyond Kant in saying that he understands our faculty to construct perception to be "*inherent*," that is, *innate*.

Another very interesting aspect that will be discussed in detail in the chapter on geometry was brought into play as early as in 1944 (!) by Ernst Cassirer: the epistemic affinity between Kant's theory of perception – especially his schematism -, gestalt theory, and the theory of transformation groups that was introduced into geometry by Felix Klein and Sophus Lie in the 19th century. This affinity centers on the problem of gestalt, object and size constancy that is dealt with in the theory of vision and is definitely beyond the explanatory power of the empiricist copying theory. The phenomenon was first identified, understood and scientifically-geometrically explained by Descartes in his famous theory of vision, *Optics*, and encouraged him to go on working towards a rationalist-idealist view of how perception is organized, away from the primitive mirror theory of sense experiences. Cassirer introduces his reflections as follows:

"*In the following reflections I shall attempt to set forth an inner connection – epistemological in nature – between the mathematical concept of group and certain fundamental problems of the psychology of perception as the latter have been more and more distinctly formulated in the last decades.*"[631]

Combining a Kantian theory of perception with Lie Transformation Groups, as they are called today, and gestalt theory was an extraordinarily

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630 Wolfgang Metzger, Laws of Seeing, Cambridge, Mass., MIT Press. 2006, p. xvii, 41, 197; and in the German edition I used – Wolfgang Metzger, Gesetze des Sehens, Frankfurt/M 1953 – Metzger invokes Kant and Descartes in his conclusion, p. 469.

631 Ernst Cassirer, The Concept of Group and the Theory of Perception, Philosophy and Phenomenological Research, Vol. 5, No 1, Sept. 1944 (translated by Aron Gurwitch), p. 5.

creative and lucid step, since it led on to the question of why certain gestalts are innate (Euclidean figures and forms, for instance) while others are not! These are crucial issues, all of which are addressed in this fascinating essay that Cassirer published in 1944 during his exile in the USA. In one of his last lectures before his sudden death in April 1945, Cassirer once more reflected on this connection between *gestalt psychology*, *group theory* and *perception*. He started with a reference to the early works of *Christian von Ehrenfels* and his 19th-century reflections on the fact that melodies and spatial figures do not change in character when they are transposed. Von Ehrenfels' suggestion that this could only be explained by an *invariant organization* of the group rather than the traits of its individual elements subsequently became the basis for gestalt theory. Cassirer kept extending this idea in his late works, quite in line with his principled argumentation against the erroneous empiricist doctrine of perception:

"*Even ordinary sense perception could, indeed, not fulfill its task – the task of building up an objective world – if it were not able to comprehend the isolated sense data under certain group concepts and if it could not determine the 'invariants' in reference to this group. In this respect sense perception is a first and elementary stage of a general process that comes to its climax and its perfection in science, in geometrical knowledge. In both cases we find, on a different scale, the same characteristic operations.*"[632]

We will deal with Lie Transformation Groups and their function in the chapter on geometry. The reason why *gestalt theory* – which, as mentioned above, has currently become something of a paradigm for *vision science* – is such an interesting approach for *rationalist Neo-Kantianism* is that it explains object recognition by the workings of *laws*, i.e. *innate* schemata, invariant forms or – if one prefers the term – *ideas*, and suggests that their application in the process of interpreting and reconstructing the individual elements of a group or structure in the field of vision is as such conducive to an insight into, or an increase in knowledge about, one's surroundings. This, then, is a form of "recognition," for the assumption is that there are certain preferred *innate forms* that provide the schemata that enable the perceptual system to structure the essentially chaotic scenario we see and *instantly organize* it into meaningful units in a spatiotemporal order. This mode is strongly reminds of Plato's doctrine, i.e. that it is the recollection of the innate idea of the circle, for instance, that allows us to see, in the "eyes of the mind," the badly drawn circle as a perfect circle. It seems in order, therefore, to go beyond these first impressions and proceed to a more in-depth discussion of gestalt psychology or *gestalt theory*, as it can be more appropriately called.

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632 Ernst Cassirer, Reflection on the Concept of Group and the Theory of Perception, in: Donald Phillip Verene (ed.), Symbol, Myth, and Culture. Essays and Lectures of Ernst Cassirer 1935–45, New Haven 1979, p. 288.

## Gestalt theory

In the early 20th century, findings from numerous ingeniously designed and sophisticated empirical experiments in *gestalt theory* suggested that our field of vision is comprehensively, and in many respects, dynamically and actively organized by certain *innate* laws. These laws were first published by Max Wertheimer who had worked at their definition since about 1910, using examples not only from the field of vision but also some sequences of musical notes.[633] Musical examples had been the basis of Christian von Ehrenfels' prefiguration of gestalt theory, who had started out from the observation that an entire sequence of musical notes could, as such, be transposed into another key without losing the melody itself, i.e. its gestalt, while the individual notes carried no such informational content.[634] (Ernst Cassirer, too, integrated insights of gestalt theory into his reflections, for instance his 1910 "Substance and Function," where he refers to music as an example and explicitly mentions Ehrenfels. In the respective passage, gestalt theory is invoked as a counter project to Locke's and Hume's epistemology.[635]) The first law described by Wertheimer was the "*law of proximity*," that is, the insight that groups of dots, lines or symbols that are close to each other are spontaneously isolated from other, more distant dots, lines or symbols and seen as *one group* by all observers. The second law, interacting with the first one, is the "*law of similarity*": *elements that resemble each other* (e.g. circles, triangles, crosses, squares) are always spontaneously grouped, isolated from other, different objects, and *perceived as one group*. When groups that have first been perceived as similar start *moving together*, they are seen as a new group even if the new group contains dissimilar elements. They now follow the "*law of common fate*," i.e., that movement of objects overrides the "*law of similarity*." Gestalt laws may counteract or dominate each other, which suggests that there must be a *hierarchy* among them and that this hierarchy may vary with the general framework, or relevant *respect*.

Another essential discovery made by Max Wertheimer, which is also of special importance for our present topic, is the "*law of good form*" and the associated insight that when interpreting the available sense data, our perceptual system tends to favor certain ideal structures, preferably symmetrical and as simple as possible, that is, to search out the "inner balance" of the respective forms. Thus, every observer who sees the constellation "Ursa Mayor" in the sky at night will perceive this familiar figure

633 Max Wertheimer, Untersuchungen zur Lehre von der Gestalt, Festschrift für Carl Stumpf, Psychologische Forschung, Berlin 1923.

634 Christian von Ehrenfels, Über Gestaltqualitäten, Vierteljahrsschrift für wissenschaftliche Philosophie, 14 (1890), p. 249ff.

635 Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, p. 333.

such as it is generally known although it would be very easy to draw completely different connecting lines and construct a host of entirely different figures. Thus, our perception relies on specific *laws* to form certain groups, figures and forms from the "kaleidoscope" of the "*raw sense experiences*" that are streaming in. This can also be expressed by the "*principle of Prägnanz (pregnancy)*," which means that under varying conditions of lighting, movement and constraints of whatever kind, our perception seeks to find not just any form, but the *simplest* and *optimal* one. This implies that the perceptual system is oriented to certain *ideal structural forms* such as *simplicity*, *closure*, the "*good curve*," *symmetry*, *uniformity* etc., that are suggestive, in the broadest sense, of Plato's perfect ideas. Objects and drawings can, then, be changed in ways that are either "*structure-appropriate*" or "*not structure-appropriate*." But this implies that our *innate* perceptual system automatically *prefers* certain forms, among them perfect and primal structures, first of all those of *Euclidean geometry*, such as the circle, the square, the triangle. This is remarkable! Wolfgang Köhler, one of the founders of gestalt theory, emphasized that this structuration of the field of vision showed two essential tendencies: a reflectory one, as it were, which is also the main tendency, and the tendency to "see" certain elements as belonging together. Wolfgang Köhler is also one of the few scholars who ventured to directly challenge the *empiricist prejudice*, at the time represented by William James. (Incidentally, William James is one of the many empiricists and positivists who in later life drifted towards irrational views, in his case, theosophy):

"*The visual field exhibits two kinds of order. One is the order with which the machine theory is occupied when it tries to explain how a given process keeps its right place between its neighbors and does not go astray. There is, however, another order in the field which tends to escape our attention, although it is no less important than the first. In most visual fields the contents of particular areas 'belong together' as circumscribed units from which their surroundings are excluded. James did not admit that this organization of the field is a sensory fact, because he was under the influence of the empiristic prejudice. Nowhere is this prejudice more detrimental than it is at this point.*"[636]

Evidently, the perceptual system is permanently seeking to establish a certain *order* or, in other words, to impose an *ideal organization* on the disorganized world of incoming chaotic individual sensations. At the same time, perception resists disorderly, muddled and asymmetric arrangements. Wolfgang Metzger speaks of the "*love of order*" (!) of our senses.[637] This is, by the way, also reminiscent of the method of ordering and arranging that Descartes recommended for the sciences in his *Regulae*. In-

[636] Wolfgang Köhler, The Definitive Statement of the Gestalt Theory, Liveright Publishing, New York 1992 (1947), p. 137.

[637] Wolfgang Metzger, Laws of Seeing, Cambridge, Mass., MIT Press. 2006, p. 19.

terestingly, the "*good forms*" also include the 90° *right angle* that is clearly distinguished from an angle of, say, 93° that is deemed "somehow not right" by study participants even if they have only seen it for a very short period. Altogether, their experiments led gestalt theorists to conclude that our preferences in shape perception are often consistent with the "good forms" of *Euclidean geometry*. Their perfect lines and "good forms" provide the ideal models for our unconscious visual preferences, and here again Descartes showed good sense in choosing them as the primal examples for the act of the effortless and clear insight that is the hallmark of *intuitive evidence*!

This insight is highly relevant because in his Transcendental Aesthetic, Kant had integrated the perception of space with the three dimensions of Euclidean geometry, a fact that was seen, and held against him, as an error by 20th-century EAN proponents. For them, this was evidence that Kantianism was hopelessly outdated and out of tune with modern non-Euclidean geometry. Now, here we have the interesting crossing point that perceptual schemata that have evolutionarily developed and are obviously successful on this planet have been "implanted" in man and allow to accomplish practical tasks that are based on *Euclidean geometry*. Thus, everyday life tasks such as carpentry, house building, road construction would surely be hard to calculate and realize if they had to be done in the physically correct sense of non-Euclidean geometry, that is, in terms of e.g. hyperbolic space. This will be further discussed in the chapter on visual thinking and geometry, but what seems certain at any rate is that in everyday life, homo sapiens' perception and its innate, successful "*love of order*" seem to prefer the figures of *Euclidean geometry*. Of course, the sum of the angles of a triangle is different when it is projected on a spherical surface, but before that, it was essential that humans knew and understood a triangle and a sphere from Euclidean geometry, and that this was the origin of geometry. Anyway, whoever challenges Euclidean geometry in order to refute Kant in favor of EAN is certainly in line with Russell's logicistic intention but no less certainly at odds, with respect to *evolutionary biology*, with the naturalistically-minded proponents of EAN themselves. Thus, EAN would have to discard one of these two positions or, even worse, admit that Kant was right all along in stating that the *natural form* of cognition, i.e. intuition and imagination, is three-dimensional "*from the viewpoint of a human being*." We will discuss this question from various angles later.

A further issue that might arise in the context of describing the "good," or "simple," form is its exact definition. When does a form qualify as *simple*, and when is it no longer simple but complex? Why should our cognition prefer simple forms, right angles and symmetries? In his famous work "Art and Visual Perception," Rudolf Arnheim, a doyen of

the gestalt school, deals with this interesting problem and offers the following definition:

"*Any stimulus pattern tends to be seen in such a way that the resulting structure is as simple as the given conditions permit*."[638]

This definition makes sense and is also flexible enough to account for the fact that due to the *hierarchy* of gestalt laws, something that should be seen as simple may fail to impose itself as the simplest form because of other intervening factors and influences. Arnheim therefore endeavors to work out definitions for the simplest possible "good" form:

"*In the square, all four edges are equal in length and lie in the same distance from the center. Only two directions are used, the vertical and the horizontal, and all angles are the same. The whole pattern is highly symmetrical around four axes." Or: "A right angle is simpler than other angles because it produces a subdivision of space based on the repetition of one and the same angle*." (loc. cit., p. 56f.)

Obviously, and this is what these examples are meant to show, perceptual "simplicity" can be *defined* and delimited from non-simple structures or objects. It seems plausible, then, that from an evolutionary point of view, the perceptual system tends to prefer these most simple figures or objects when it needs to structure the overly complex and diffuse field of vision.

Arnheim then refers to Julian Hochberg who specified *three quantitative features* to allow for a more precise definition of "*simplicity*": "the *number of angles enclosed within the figure*, the *number of different angles divided by the total number of angles*, and the *number of continuous lines*." This tendency of our perceptual system to organize a visible structure in the simplest possible way is called its "*orderliness*" by Arnheim.[639] Even though in the individual case, the definition of "simplicity" may not always be that clear and there may be exceptions, this arguably is not so much a law but a *rule* and is thus even closer to Kant's method. At any rate, in terms of definition, these few indications allow us to understand what is meant by a *simple* or *good* form, for in gestalt psychology, these concepts are predominantly explained by diagrams, which makes them immediately and intuitively understandable due to *visual thinking*. Incidentally, it should be noted that our *imagination* is sufficient only when dealing with simple forms. It is not for nothing that Descartes, in his

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638 Rudolf Arnheim, Art and Visual Perception: A Psychology of the Creative Eye The New Version, University of California Press 1974, p. 63.

639 Rudolf Arnheim, Art and Visual Perception: A Psychology of the Creative Eye The New Version, University of California Press 1974, p. 57f.

Sixth Meditation, discusses the difference between a pentagon, which he can still imagine clearly enough, and a chiliagon.[640]

Apparently, evolution has not only endowed us with an imagination that invariably seeks to reduce complex perceptions to simple archetypical forms such as, for instance, those of Euclidean geometry, it has also limited the "power of imagination" to relatively simple figures. In the course of time, further gestalt laws were discovered, among them the "*law of closure*" and the "*law of good continuation*," all of which serve to organize and structure the field of vision in a way that is meaningful and as simple as possible. Wolfgang Metzger refers to laws such as, for instance, the "*law of the greatest background uniformity*," the "*law of the continuous straight line*," the "*law of convexivity*," the "*law of balanced form, or law of symmetry*," the "*law of parsimony*." As mentioned above, these laws are hierarchically ordered, and understanding the way they interact or overlap has helped to explain many optical illusions such as, for instance, why the spokes in the wheels of a carriage that starts rolling seem to turn backwards. An interesting aspect of the visual system's preference for *symmetrical forms* that was established by gestalt law experiments is the fact that in the context of mate selection in birds, male individuals with symmetrical tail feathers are clearly preferred. The respective individuals turn out to be healthier and stronger than their "asymmetrical" colleagues.[641] Whether this is purely coincidental or has a genetic background in evolutionary development is still unclear.

The essential starting point for the insights, seminal even today, of the Berlin group of gestalt theorists was the insight that *the whole is more than the sum of its parts* and that this "more," this "gestalt" – and here they are in accord with idealist epistemology – is not "given" *as such* by the individual dots. Rather, in the final analysis, it is the mind that – when "seeing" (a circle, for instance), through thinking – projects this gestalt into the individual dots of sensory perception. Thus, although gestalt theory, too, assumes similarity and individual dots or objects, this assumption is the very opposite of Hume's flawed model of perception and type of association, as Wolfgang Metzger explicitly notes:

"*Nevertheless, we will still not call our laws the laws of association. For the very name suggests an erroneous view: the view that the formation of mental entities is always a summarization of preexisting individual elements. But actually, … the basic process that is governed by the laws we have described consists in separating the individual*

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640 René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 50f.

641 J. Zrzavy, H. Burda, D. Storch, S. Begall, St. Mihulka, Evolution, (Springer) Berlin/
Heidelberg 2013, p. 47.

*elements that the doctrine of association assumes to be its primal material from the more comprehensive complex and, thus, in creating them as such, in the first place*."[642]

What remains to be done now is furnish the proof that gestalt laws have really become the basis of the modern theory of vision. In his standard work, Gregory shows that this is actually the case:

"*This may seem vague, hardly scientific; but the Gestalt laws of organization have turned out to be important for perception of sight and sound. They have been taken up by the artificial intelligence (AI) community, especially for programming computers to recognize patterns and objects. The laws include:*

1. *Closure-tendency for roughly circular patterns of dots to be seen as 'belonging' to and forming an object*
2. *Common fate-parts moving together, as leaves of a tree, seen as an object;*
3. *Contiguity of close-together features; and a preference for smooth curves*

*The laws of organization were supposed to be inherited, but as they correspond to common features of almost all objects, learning could be involved, to give us all much the same visual organizations*."[643]

With the revitalization of *gestalt theory* and its organizational laws, brought about by the new insights gained when computer programs were developed in *vision science*, the entire understanding of visual perception began to move away from empiricism and towards the more intelligent rationalist models. After so many decades, it seems to have finally turned out that it is marginalized *gestalt theory*, rather than behaviorism or empiricism, that has been right all along but may have been too "Teutonic" (the English translation of Wolfgang Köhler's 1947 book on *gestalt* is of such a poor quality that trying to understand what he might have meant in German was quite a challenge even for me![644]) and too rationalist to not succumb to the onslaught of the EAN dogma and its 20th-century followers. So, what is the problem of the empiricist-type theories of perception? According to Stephen Palmer, the main flaw of most of the empiricist and realist theories of perception is what he calls the "*experience error*" (!):

"*The major difficulty with the view of naïve realism is that the visual system does not have direct access to facts about the environment; it has access only to facts about the image projected onto the retina. … The confusion that underlies the experience error is typically to suppose, that the starting point for vision is the distal stimulus rather than the proximal stimulus. This is an easy trap to fall into, since the distal stimulus is an essential component in the causal chain of events that normally produces visual experiences. …Taking the distal stimulus as the starting point for vision, however, seriously*

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642 Wolfgang Metzger, Gesetze des Sehens, Frankfurt/M. 1953, p. 80 (passage not included in the English translation; translator's note).

643 Richard L. Gregory, Eye and Brain, The Psychology of Seeing, Princeton University Press, Princeton and Oxford 1997, p. 4.

644 Wolfgang Köhler, The Definitive Statement of the Gestalt Theory, Liveright Publishing, New York 1992 (1970).

*underestimates the difficulty of visual perception because it presupposes that certain useful and important information comes 'for free'. But the structure of the environment is more accurately regarded as the result of visual perception rather than the starting point. As obvious and fundamental as this point might seem, now that we are acquainted with the difficulties in trying to make computers that can 'see' the magnitude of the problem of perceptual organization was not fully understood until Wertheimer raised it in his seminal paper in 1923.*"[645]

Two points are essential in this passage: first, its characterization, perfect in my view, of the naïve misconception of the actual process of perception – "*taking the distal stimulus as the starting point for vision*" – as the "*experience error*," the "*easy trap to fall into*" (which EAN exponents, however, have kept falling into for at least four hundred years, all the while feeling superior to and looking down on the other theories!). Second, the fact that it took *the development and implementation of computer programs*, which set in around the year 1980, to make scientists realize what rationalism has taught for the last 2300 years and what *Wertheimer had published as early as in 1923*:

The "given" is actually *"the result of visual perception rather than the starting point!"*

And I really do like the term of "*experience error*" – we should use it from now on as a synonym for empiricism and EAN as a whole whenever they refer to "*experience*." Wolfgang Metzger had described this turn as early as in 1953 under the heading of "Thinking Instead of Seeing":

"*This means that differences in real external objects, which certainly are lost in the light rays and in the retinal image, suddenly* reappear *in the perceived object that arises from the retinal image!*"[646]

This means that we think the things by imagining them, or *complete* them through thinking so the "mutilated" physical image makes sense again, which also implies that without being *formed* by the mind, the "*given*," the sense data *as such*, can never make *sense* of its own accord!

Thus, today, after neuroinformatics and modern computer programs had forced the conclusion that the empiricist assumptions were nothing but a mythical belief that was deeply entrenched, traditional, strongly promoted and yet, not unlike the apparently flat earth or rising sun, simply wrong – today, gestalt theory has become the dominant theory of *vision science*. But the laws of gestalt also offer some further insights, already mentioned above. There is, for instance, the "*closure tendency for roughly circular patterns*," already described by Plato in his Seventh Letter: in the visual process, and guided by gestalt laws, we will project the "good form"

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645 Stephen E. Palmer, Vision Science, Bradford MIT Press, Cambridge London 1999, p. 257.

646 Wolfgang Metzger, Laws of Seeing, Cambridge, Mass., MIT Press. 2006, p. xviii.

of the perfect circle into the roughly circularly and never perfect arrangement of dots, and think it as closed. The ideal figures of Euclidean geometry will be projected, through thinking, even into carelessly done and irregular sketches, a process described by Plato for the circle and by Descartes for the triangle. We can imagine an imperfect and carelessly done sketch of a square as a perfect geometrical square, and even the uneducated slave boy in the Meno dialogue understands that even though the line may be "frayed" or broken, a diagonal in a square drawn in the sand divides the latter into two triangles of equal size. This also holds for similar processes such as the preference for the "good" right angle over the slightly oblique ones. What used to be shrugged off and ridiculed as the figments of hopeless rationalists and Kantians is now, in the age of computer programs, *tacitly* assumed to be right and trend-setting; while thinkers such as *Descartes* have rarely (as in Gregory) been accorded the credit they deserve. But reference should also be made to Kant at this point, who effected a kind of Copernican revolution and paradigm shift by postulating that it is the understanding that imposes their *organization* on things rather than read it off from their sense data. This is confirmed by gestalt theory and modern neuroinformatics with respect to perception since in the visual process, we constructively see a "good form" in a lot of "bad" dots, lines and surfaces, that is, ascribe their good *gestalt* to them or, in other words, "*organize*" the *bad* "*given*" in a *good*, *proper* way.

But besides this intriguing link to geometrical forms and the innate *organization of the field of view* according to the *laws of gestalt theory*, there is another overlap with *gestalt theory* in perceptual theory, in vision science, namely the issue of how we are able at all to gain intellectual "*insight*." We have already seen that the organization of the field of vision, or of the scene we perceive, must happen very quickly, if not *instantly* (so we can instantly recognize the figures of natural enemies, for instance) and that there are certain patterns that are preferred, or even pop up "automatically," in our interpretation of surfaces, edges, forms, movements. These processes could still be located at an innate natural-physiological level. But at the same time, at a much higher epistemological level, there is the problem of how we are able at all to gain *insight*, that is, solve a problem and gain knowledge, *how* insight into an at first incomprehensible context is possible at all. And as we have shown before, this mode of *insight* is a basic concept of rationalism and, therefore, a core issue in its controversy with the EAN doctrine.[647] So, to get a better grasp of how "vision," that is, thinking seeing and seeing thinking are logically intertwined and where there are transitions, overlaps and further developments, let's take a closer look at the connection between vision science,

[647] Laurence Bonjour, In Defense of Pure Reason, Cambridge University Press, Cambridge 1998, offers a very good overview over these objections.

gestalt theory, the philosophical concept of *insight*, the "Aha! moment" and, last but not least, the *understanding of function*, that is, thinking without language.

### Excursus: The concept of insight, the Aha! moment, "simple natures" (Descartes), and the "understanding of function"

In his description of the principles of *gestalt theory* in "Eye and Brain," Gregory refers to the central role of the concept of "*insight*" that is essential for both *rationalism* and the *visual turn*. One of the first researchers to scientifically investigate *insight* (apart from Descartes and his exposition of *intuitive evidence* in the *Regulae*) was Otto Selz who in the early 20th century set forth a theory, based on methodological and empirical studies, of how *insight* is gained in the course of *orderly thinking*. Otto Selz was a disciple of Oswald Külpe and a colleague of Karl Bühler and as such belonged to the Würzburg school of psychology. He made important contributions to the psychology of perception and thinking, thus providing a basis for gestalt theory to build on. In 1943 he was murdered by the Nazis in Auschwitz concentration camp, and was more or less forgotten. Selz was not satisfied with the prevalent empiricist theory of thinking *qua association*. Starting out from the phenomenon known as the pathological flight of ideas where random *associations* "happen" in a disorderly and undirected way, he began to investigate the question of what orderly thinking means and what are the laws that govern it. He found that the identification of the correct answer to a test question followed certain patterns. The first step involved what he called an "*actualization of knowledge*": the test person had a hunch of what the correct answer should be but could not gain the actual *insight* unless *existing knowledge* was *actualized*. Selz also observed that especially with tasks that required the test person to complete a complex (which in his case could consist of letters, signs, or geometrical figures), reproduction followed an "*anticipating schema*." He accordingly defined one of the three laws of *complex completion*, in this case the second one that is also of special relevance for the present study:

"*A schema that anticipates a complex in all of its elements tends to trigger the reproduction of the entire complex.*"[648]

The law of *complex completion* that guides the knowledge actualization process, that is, the solution of test questions, already prefigures gestalt theory. For Selz, it led to the conclusion that there were certain *anticipatory schemata* that were *activated* in the problem-solving process and, thus,

[648] Otto Selz, Über die Gesetze des geordneten Denkverlaufs, Stuttgart 1913, p. 128.

triggered an understanding of the entire complex. Thus, in the process of *orderly* thinking, correct and meaningful solutions for an *incomplete complex* could be reached – and this is the relevant aspect – by *activating anticipatory schemata*. Selz already noted the relevance of these "transformations" for the problem solving process, and the schemata in question are in some ways suggestive of gestalt theory, but also Kant's schematism; but let's not anticipate. Building on Otto Selz, Karl Duncker, a disciple of Max Wertheimer and Wolfgang Köhler, defined a "*problem*" as follows:

"*A problem arises when a living creature has a goal but does not know how this goal is to be reached. Whenever one cannot go from the given situation to the desired situation simply by action, then there has to be recourse to thinking*."[649]

Thus, "*recourse to thinking*" is needed when a problem arises. Why? Because by thinking we can ultimately solve the problem and also gain something in the process, namely *knowledge* that is adequate with *respect* to the problem and that (in this *respect*) we did not have before. Gaining *new* knowledge by thinking, by *insight*, is the single most important faculty of man and has ensured, prolonged and improved his survival to this day.

A similar process was observed and described by Wolfgang Köhler in the course of his famous experiments with chimpanzees. Due to the experimental design, these tests may be deemed unsustainable by modern-day criticism, but they do point the way. Here is what Köhler's "most intelligent" chimpanzee "Sultan" did: "Presented with a banana out of his reach and a number of short sticks, he was described as looking at the sticks for several minutes, then suddenly joining two together" – (something he had never done before) – "to pull down the banana."[650] This observation emphasizes the emergence of a *sudden insight*, the so-called Aha! moment when it occurs in humans, which also plays an important part in *gestalt theory*. Of course, the sudden "seeing" of a form in a mass of dots is as such not yet what one would call problem solving, but it can arguably be conceived of as a pre-stage, or a move, guided by gestalt laws, from the *sudden organization of the field of view* to the *sudden rational insight* into a problem. This is nothing to do with seeing in terms of the two-dimensional arrangement of the retinal stimuli. It is a cognitive-visual achievement and, as such, while significantly more than mere "seeing," not yet actual problem solving, real *insight*. But it is not hard to image a situation where this "*mental seeing*" or "seeing with the eyes of the mind" leads to the solution, or at least part of the solution, e.g. thinking of the

649 Karl Duncker, On Problem Solving, Washington, DC, American Psychological Association 1945, p.1.

650 Richard L. Gregory, Eye and Brain, The Psychology of Seeing, Princeton University Press, Princeton and Oxford 1997, p. 4.

points of light of certain stars or planets as traveling on an elliptic rather than circular orbit.

In his interesting book "*The Act of Creation*" Arthur Koestler has described this cognitive process – in contrast to *association*, that is, the random situational linking of different thoughts – as "*bisociation*," that is, the act of seeing a certain connection or function in a *second*, new respect, or perspective. He opens with a discussion of the mechanism of the joke, which is particularly interesting for our topic here because the mode of rational *insight* is habitually, if not negated, at least discredited as vague and defying scientific verification by EAN. From the EAN point of view, we are supposed to gain new knowledge from "*experience*," i.e., as described above, by the step-by-step accumulation of minimal increments in knowledge from *sense-experience* alone. But from the viewpoint of *rationalism*, insight into the essence and the solution of a problem is gained by the sudden "clicking into place" of this insight at some point of the investigation when one "sees the light," as the saying is, or "the scales fall from one's eyes." The joke, unscientific as it may appear at first sight, is a very instructive example that helps to clarify this process. For the sudden revelation of the amusing aspect is due to an abrupt change of the *perspective*, the *respect*, the *frame of reference*, that leads to a *reinterpretation* or *reconstruction* of the initial situation.[651] The same is true, however, for all contexts where a position that was assumed to be unshakeable takes a *sudden* turn that changes the *respect* in which the problem was previously considered and *abruptly* reveals the solution to a problem that was deemed intractable. For philosophy, a case in point is Kant's "Copernican" revolution – set forth in the Preface to the second edition of the Critique of Pure Reason[652] – namely his insight that it is reason that imposes the laws on things, thus reconnecting, as it were, with Copernicus' achievement of inversing, through reasonable and rational insight, the seemingly unambiguous *sense experience* of an observer that the sun revolves around the earth. Concerning the controversy with EAN, the relevant feature of the joke is that its amusing effect can only be achieved when the punchline, that is, the moment the change in perspective or respect happens, is brought off *in the blink of an eye*. If the listener has understood the joke, the new perspective occurs to him *abruptly*, making him or her laugh out loud. He or she has *suddenly grasped* a new respect in which to see the story and which they had not previously seen. He or she has gained a new insight, new knowledge. It is a leap from 0 to 1. Either the joke was understood, then the punchline, and with it the amusing effect, strikes one *suddenly because* one has not only understood it, but understood it the

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651 Arthur Koestler, The Act of Creation, Picador Pan Books, London 1975, p. 34f.

652 Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, B 74B XI–XVII.

moment it was delivered. The person who has understood the punchline is rewarded by a surge of pleasure and laughter, and the person who told the joke is also rewarded, namely by a positive sense of superiority because she was able to trigger this sudden pleasure. If the punchline was not understood, there is zero effect, and no new insight is gained. This is why jokes have a maximum effect when the punchline is a single word, or a compound of very few words, that all at once changes the perspective and opens up the new *respect* in which to see the facts.

But while these introductory reflections help to narrow down our understanding of the nature of the phenomenon of "*insight*," they do not yet offer a fully satisfactory definition. So, hoping for further specification, let's turn to Richard E. Mayer's book on "*The Nature of Insight*" and the respective discussion it initiated the 1990s. In his book, Richard E. Mayer gives an introductory overview of the definitions and developments of the concept of insight in recent decades. His first definition of insight is as follows:

"*The term insight has been used to name the process by which a problem solver suddenly moves from a state of not knowing how to solve a problem to a state of knowing how to solve it (Mayer 1992)*."[653]

Like the mechanism of the joke, this is a process or situation where someone who wants to solve a problem is suddenly enabled to move from the state of not knowing to "*a state of knowing how*." This is the very process of *how* knowledge is gained, how the *correct* (!) insight suddenly kicks in. Considering that at all times, someone's survival could depend on their being able to move from a state of not knowing to a state of knowing how to solve a problem, surprisingly little consideration has been given to this issue! Mayer then brings in the main objection that was primarily raised by proponents of EAN and that Wertheimer was allegedly unable to refute, namely the question why (since this is supposed to be a *universal* and *necessary* ability) some people can solve problems and make inventions while others can't. In my view, this is a weak objection, for in the world of mathematics, for instance, whoever wants to correctly do calculations or solve equations will have to go from the state of not knowing to the state of knowing the correct solution. This may take one person longer while another person may be quicker, but the method at each step doesn't change and, what is even more important: nor does the leap from 0 to 1, the leap of insight that takes you from a state of not knowing to a state of understanding the problem.

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653 Richard E. Mayer, The Search for Insight: Grappling with Gestalt Psychology's Unanswered Questions, in: Robert J. Sternberg, Janet E. Davidson (Eds.), The Nature of Insight, Bradford Book MIT Press Cambridge/London 1995, p. 3.

Mayer then offers the following five definitions of "*insight*," which are also those that have been most frequently studied or discussed: 1. *completing a schema*, 2. *reorganizing visual information*, 3. *reformulating a problem*, 4. *overcoming a mental block*, 5. *finding a problem analog*. Now, as I see it, all these definitions are just different aspects of one and the same process, with *reformulating a problem* and *reorganizing visual information* most closely answering to the description we are looking for and actually describing the same phenomenon, only at a visual level in the latter and a more abstract one in the former case. The *anticipating completion of a schema* also presupposes a reorganization based on a given mental structure (the schema) and is, thus, also a *form of reorganization*. This anticipative approach was first suggested by Otto Selz, whom Mayer quotes as follows:

"*The solution emerges, not through a senseless play of associations' (…) but rather 'the initiatory event of a goal-directed cognitive operation must always be a schematic anticipation of the goal.*" (loc. cit., p. 9)

Thus, the *senseless play of associations* (which may refer to Hume's description of the thought process) is no longer an issue. The fourth definition, that is, *overcoming a mental block*, for instance a mental fixation on a certain solution path or respect, is just the psychological way of saying that what counts is the *reorganization* of a known content in a new *respect* and, thus, just part of the process. And point five, *finding a problem analog* just refers to a different phase or a different aspect of the reorganization and is, therefore, also just one aspect of the same process. Ultimately, the crucial definitions that remain are "*reorganizing visual information*" and "*reformulating a problem*," where the former is of course of special interest for the topic of the *visual turn*. Here, Richard Mayer refers to Wolfgang Köhler's definition, that is, that of the gestalt school:

"*Insight occurs when a problem solver literally looks at a problem situation in a new way – that is, when the visual information suddenly is reorganized in a way that satisfies the requirements of the goal. This view emphasizes the visual nature of insight: Just as perception involves building an organized structure from visual input, creative thinking often involves the reorganizing or restructuring of visual information.*" (loc. cit., p. 10)

This definition is perfectly in line with our foregoing discussion: just as the structuring of the field of vision, or the organization of what we perceive, makes us suddenly, through an act of visual recognition, understand the objects we see, creative problem solving is enabled by our seeing the problem in a new respect or, in Marcus Giaquinto's apt phrasing, by "*viewing a form in two ways at once*," or, to use Arthur Koestler's term, by "*bisociation*," that is, the turn that makes us see a situation in a new respect, i.e. two respects, old and new. The process is the same as with the

joke: we know something in a certain respect until a new respect suddenly imposes itself. Paradigmatically, this definition already prefigures the development of *visual thinking*. Wolfgang Köhler used geometrical examples to explain this "seeing," that is, thinking, a problem in a new respect, and so we have come full circle with Plato's Meno and Descartes' discovery, by means of geometrical examples, of *intuitive evidence* in his Regulae. Mayer also points out that the definition of insight proposed by *Karl Duncker* in "On Problem Solving" – "*reformulation of a problem*" – is closely related to the above definition.

In "On Problem Solving," his standard work of *gestalt theory*, Karl Duncker explores the issue, already referred to above, of *how* it is possible for us to gain a new *insight* that has the potential to solve a problem and at the same time prove that the knowledge gained is not arbitrary but "correct" or "true," since otherwise the problem had not been solved. Building on Otto Selz' "transformation" doctrine, Duncker distinguishes between two general problem-solving processes: first, the *sudden insight* that is brought about in one step by the *reformulation* of a problem and, second, the solution of a comprehensive and complex problem that requires a restructuration and the solving of individual *substeps*. So, on the one hand, there is *sudden insight*, especially with *visual* problems such as those, for instance, in geometry or engineering – Duncker calls this moment of enlightenment a "clicking in" – and, on the other, issues that are more complex and do not lend themselves to intuitive insight but require a deductive approach. On no account – and this is Duncker's conclusion from his own experiments – the solution is found by simple association as proposed by Hume's doctrine:

"*It is probably clear that the solution cannot take place reproductively by virtue of mere* 'associations' *among the contents of the various phrases. The explanation by association, moreover, becomes no more plausible if one adds the thesis that not these identical contents, but only similar ones, have been previously associated, and that this suffices. Let it be kept in mind that the classical concept of association has no reference to any such 'material' relations between associated contents as 'cause of…' or 'solution of…,' but solely to temporal and spatial contiguity or similarity. But between a problem or its several parts and a solution there is no more spatial and temporal contiguity and no more similarity than between that problem and innumerable other contents…*"[654]

This reads like a direct refutation of the association theory of thinking, of resemblance, proximity in time and space, etc., as proposed by Hume. Problem solving, for Duncker, requires, first, an understanding of the essential structure of the problem and, second, a restructuration that re-

[654] Karl Duncker, On Problem Solving. Washington, DC: American Psychological Association 1945, vol. 58, no. 5, whole no. 270, p. 18.

sults in a change of perspective and hence the *function* of certain of its elements. This again points towards the *concept of function* in Cassirer. In an interesting aside, Duncker notes that what is called "capacity for thinking" or "intelligence" is actually defined by the "ease with which these thought materials can be *restructured*." Finally, Duncker addresses the point that is decisive for us here, namely the crucial question of how to distinguish between "*analytic*" and "*synthetic reading-off*"; where "reading-off" is supposed to describe the grasping of the solution to the problem (although this does seem somewhat contrived). He defines this mode of cognition as follows:

"*The reading-off of a fact which is* non-constitutively *co-contained we shall call* 'synthetic explication.' *In this, a new aspect is 'affixed' to the situation constituted in the premises (compare Kant's expression, 'synthetic judgment'). The 'extraction' of a* constitutively *contained element, on the other hand, may be called 'analytic.'*" (loc. cit. p. 49)

In the course of his studies and experiments, and with explicit reference to Kant, Duncker then gets down to one of the core topics of philosophy: is it possible to gain new, additional or yet unknown *insights* the EAN way, that is, only by association based on the given or by an analysis of what is already known, or does solving a problem and generating new knowledge mean that the known ways of thinking have to be "*restructured*" in a creative, innovative and completely new way, that is, to be synthetically reconnected, thus transcending the familiar "copying mode"? He discusses numerous examples from mathematics, geometry, engineering, as well as various problem tasks, and comes to the following conclusion:

"*Most important: As we shall see, without synthetic insight and evidence, productive thinking is nowhere* psychologically possible, *either in mathematics and logic or in the investigation of reality. More generally formulated:* the kind of experience in which synthetic evidence occurs represents the psychological medium of all productive thinking, postulational thinking included. … *Now, obviously*, … synthetic evidence is possible for this reason. As a rule, a situation may be constructed, or defined, by means of fewer facts than can afterwards been read off from it if new points of view are applied." (loc. cit. p. 52)

This important finding highlights two insights that are important for our topic: first, the insight that "*the kind of experience in which synthetic evidence occurs represents the psychological medium of all productive thinking*," which supports our view that all our thinking grew out of *visual thinking* and only gradually and relatively late transitioned into language-based thinking. Second, the importance of *synthesis*, that is, the synthetic a priori judgment, without which we would just get stuck in circular reasoning without ever being able to discover a new aspect (or "*points of view*"),

which is his term for *respect* in this context. This takes us one step further: problem solving by a restructuration that results in a turn to a new point of view is *synthesis*, and synthesis is the basis of *insight*. Duncker then presents another geometrical example where a point, while remaining at exactly the same spot in a construction, takes on a new *function* in a restructured, new respect that, as Cassirer would say, could not arise from the individual elements of the problem itself:

"*Actually, with the change of its 'function,' the point remains not only numerically identical … but it remains identical also as to spatial location.* But this means that it remains identical in the respect in which it serves as 'foundation' for the two successive functions." (loc. cit., p. 54)

Again, the concepts of *function* and *respect* are invoked at a crucial point of the argumentation to throw into relief the process of *synthesis* in the thought-based insight in its logical relation to the elements of a problem. Duncker then draws the conclusion from the insights gained so far:

"*Synthetic evidence is possible through the fact that from a situation given in a certain structuring and characterized by certain functions (aspects), without any change in essential foundations new functions (aspects) may be read off by virtue of new organizations. By new functions, I mean functions which have not been utilized in characterizing the original situation. With this Kant's general question: 'How are synthetic judgments a priori possible?' is answered, provided that 'synthetic' is understood in the sense of following from non-constitutive co-containedness,, 'analytic' in the sense of explication through constitutive co-containedness, and 'a priori' in the sense of intelligible.*" (loc. cit., p. 54f.)

Thus, based on the findings of his empirical studies, Karl Duncker psychologically reconstructs the essential element of knowledge acquisition as laid out in Kant's philosophy and comes to a similar conclusion with respect to how *insight* is in principle gained and, more generally, how *new* knowledge can be "thought up." Duncker's explanation, it is true, does not cover the logical aspect of Kant's principled philosophical question, namely how to ground synthesis in logic, but it still suggests a practicable way. In the last sentence of his book, however, Duncker returns to an aspect that we have come upon before:

"*But how is it that with many people the perceptual structuring dominates so excessively? Clearly, with them these perceptual structures play an indispensable role, more or less as do the visual images with people of the visual type.*"[655]

For us, of course, the answer is easy because we have considered and taken into account *visual thinking* as a pre-stage of conceptual thinking!

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[655] Karl Duncker, On Problem Solving, Washington, DC, American Psychological As-sociation 1945, p. 111.

Concerning *vision*, the characteristic *suddenness* of *visual reorganization* was already observed and commented upon by both Wolfgang Köhler and Richard Mayer. As empirical research on the Aha! moment has shown, this sudden insight, the *sudden connection* that is established, in a *new respect*, between *previously separate aspects* is accompanied by a distinct sense of pleasure, epitomized in Archimedes' Eureka! exclamation. In their interesting publication "*Gaining Insight into the 'Aha' Experience*," Topolinski and Reber describe the four characteristic features of this psychological phenomenon: 1. *Suddenness*: you all *at once* know the solution to the problem, you "*see the light*"; 2. *Ease*: however difficult and fruitless previous attempts at solving the problem may have been, the sudden insight is accompanied by a sense of *ease*. 3. *Positive affect*: this positive affect is felt immediately and the moment the problem is solved and is *not* a post hoc manifestation of something like pride in one's achievement; and 4. *Truth and confidence*: the sudden insight comes with the certainty that it is correct.[656]

A similar definition of *insight* is offered by Collen Seifert and colleagues in their publication "*Demystification of Cognitive Insight*" by quoting "Webster's New World Dictionary": "insight is '*seeing and understanding the inner nature of things clearly, especially by intuition*;'"[657] where "seeing clearly," I might add, once more strongly resonates with the definition proposed by Descartes. The authors then describe the four characteristics of insight as follows: "1. *Suddenness*, *wherein insight seems to happen abruptly through a quantum leap of understanding instead of some gradual incremental process*, 2. *Spontaneity, wherein insight seems to happen internally of its own accord without the intention or effort of an instigating agent*, 3. *Unexpectedness* and 4. *Satisfaction*, *whereby insight elegantly fulfills a previously unresolved need, culminating in a triumphant 'Aha!' experience*" (loc. cit., p. 67). With these two definitions, the process seems rather adequately described.

But there also is an interesting parallel in the theory of perception, today largely based on *gestalt* theory. In his book "*Illusionen des Sehens*," Thomas Ditzinger describes the way the perceptual system responds to certain patterns that it is at first unable to order and structure:

"*But our perceptual system, rather than make do with this state, permanently seeks to obtain an ordered perception. This 'inner unrest' suddenly gives way to the perception*

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656 Sascha Topolinski, Rolf Reber, Gaining insight into the "Aha" experience, Current Directions in Psychological Science 2010, 19(6), 402–405.

657 Collen Seifert et al.: Demystification of Cognitive Insight, Opportunistic Assimilation and the Prepared-Mind Perspective, in: Robert J. Sternberg und Janet E. Davidson (Eds.), The Nature of Insight, Bradford MIT Press, Cambridge/ London 1995, p. 66f.

*of a meaningful interpretation that transforms the individual patches into an overall image. This state turns out to be of enduring stability*."[658]

This means that our perceptual system permanently seeks to automatically establish a certain *order* and once the right gestalt has suddenly been found, attains a state of stability. Once we have discovered – "seen" – the figure that is "hidden" in, for instance, the "sea" of patches and sense impressions that make up a stereogram, we cannot but "see" this figure or gestalt every time we look at it although we were previously unable to perceive it in the unstructured chaos. This *kinship* – as I quite deliberately propose to describe it – between the *innate* "ordering functions," or primal forms of thinking, in visual perception and the processes of gaining *insight*, or problem solving in general, i.e. of understanding certain connections in a new respect, is confirmed by J. Schooler, M. Fallshore and St. Fiore in their summary in "The Nature of Insight":

"*Having reviewed the mechanisms underlying the formation and overcoming of the impasses to insight, we now must confront the central question of insight (at least, when it is defined as the sudden shift from an impasse state to a solution state): How is it that the solver moves so suddenly from an impasse to a solution state? We share the view that the sources of the suddenness of insight are closely aligned with those associated with the suddenness of various perceptual processes. Throughout our previous discussion of the causes and techniques for overcoming impasses, we have attempted to draw parallels between the processes of insight and those of perception.*"[659]

This conclusion strongly supports our reasoning so far, namely that "*the sources of the suddenness of insight are closely aligned with those associated with the suddenness of various perceptual processes*," that is, that the modus operandi of the perceptual system is very similar to the thought process that leads to an *insight*. Just as the *grammar of vision* (R. Gregory) is similar to *universal grammar* (Noam Chomsky), the purely mental process of gaining new insights is strongly reminiscent of the gestalt law-guided processes of perception, as we could show in the above. If you go along with my approach that our understanding has evolved from *visual thinking*, then what we have here, from a broader perspective, is the *establishing of order* that is accomplished *according to certain rules*, i.e. the innate *gestalt laws* that guide visual perception, and by a shift of perspective, or *respect*, that characterizes the act of *restructuration* that results in the gaining of insight! In the chapter "*Further Evidence for the Perceptual Nature of Insight*," the authors refer to a number of experiments that show that the processes involved and the results obtained in the identification of "out-

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658 Thomas Ditzinger, Illusionen des Sehens, Heidelberg 2014, p 13.

659 J. Schooler, M. Fallshore, St. Fiore, Putting insight into perspective, in: Robert J. Sternberg und Janet E. Davidson (Eds.), The Nature of Insight, Bradford Book MIT Press, Cambridge/London 1995, p. 576f.

of-focus" – i.e. fuzzy – pictures are very similar to those involved in the sudden gaining of *insight* in problem solving. They come to the following conclusion:

"*This analysis suggests that suddenness of both insight and visual recognition may be associated with situations for which there exists a potential source of coherence that can unite a seemingly disparate set of elements.*" (loc. cit., p. 579)

And this brings us back to the phenomenon of "*complex completion*," published by Otto Selz as early as in 1913, and to Wertheimer's completion of the "good form" or, in still other words, to Marcus Giaquinto's elegant description of "*viewing a form in two ways at once*," where this "at once" may also cover the act of "seeing" a new function of an object or connection or "seeing" a known function in a new respect. The process described is also similar, in the broadest sense, to the genuine schema of all *conceptual* cognition and, in principle, consists in trying to "subsume" different phenomena under one concept. In Kant, this applies to both the understanding that is "*a faculty of unity of appearances by means of rules*" and reason that "*is the faculty of the unity of the rules of understanding under principles*."[660] However different the cognitive levels, the success principle is always the same: what is incomplete is completed, what is a manifold is synthesized, schematized and ordered, what is fragmentary or incoherent is made coherent and brought into *unity* in a certain *respect*, *a specific order*.

In addition to these first psychological studies, there has been an increasing number of natural science studies that substantiate the facts of *sudden insight* and the Aha! moment. Using EEG and MRI technologies, John Kounios and Marc Beeman, for instance, recorded the processes that take place in the brain before, during and after the Aha! moment, that is, the gaining of *insight*. In the abstract of their paper, the issue and their findings are summarized as follows:

"*A sudden comprehension that solves a problem, reinterprets a situation, explains a joke, or resolves an ambiguous percept is called an insight (i.e., the "Aha! moment"). Psychologists have studied insight using behavioral methods for nearly a century. Recently, the tools of cognitive neuroscience have been applied to this phenomenon. A series of studies have used electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) to study the neural correlates of the "Aha! moment" and its antecedents. Although the experience of insight is sudden and can seem disconnected from the immediately preceding thought, these studies show that insight is the culmination of a series of brain states and processes operating at different time scales. Elucida-*

660 Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, B 359.

*tion of these precursors suggests interventional opportunities for the facilitation of insight*."[661]

They provide detailed evidence showing that whenever a test person had to search for an adequate word whose meaning would fit each of three given words in a certain verbal test (e.g.: shoe – ball – man, the solution being: snow), an alpha wave was building in the rear part of their brain while the correct answer was in the course of preparation, and was followed by a strong gamma wave in the temporal lobe when insight kicked in. An alpha wave typically builds when one's eyes are closed and the activity of the visual cortex is reduced. Considering that the visual cortex is located in the occipital, that is, the rear part of the brain while language processing takes place in the temporal lobe, this suggests that the word one is looking for is found right after vision that takes up a large part of the brain's activity is briefly suspended, and that this is the way insight is gained. Kounios and Beeman list a number of famous cases where the solution to a problem was suddenly found when the person who tried to find it was doing something else. One such case is the Irish mathematician Sir William Rowan Hamilton and the geometrical conception of imaginary numbers (negative square roots) that suddenly occurred to him when he was crossing a bridge.[662] Similarly, Poincaré, in an autobiographic passage in his book "Science and Hypothesis," describes how the solution to a difficult mathematical problem occurred to him the very moment he placed his foot on the running board of a bus.

Today, the facts of the Aha! moment and its physiological basis in the brain seem to be empirically validated. What still needs to be determined, however, is the exact position of the Aha! moment – that only occurs in certain situations – in the process of cognition, for this would enable us to put it into relation to Descartes' *intuitive evidence* and *simple natures* which are also fundamentally "one-step" phenomena that are suddenly there, "all at once." The Aha! moment would, then, be the creative answer to problems that are too diffuse for us to understand intuitively and effortlessly *in a single act*, on the one hand, but cannot be dealt with in the systematic-deductive step-by-step way of solving an equation, on the other, because solving them requires a fundamental change in perspective. At any rate, a scientifically sound determination of the mode of *insight* is highly relevant for *rationalism* when it comes to invalidating the objections of empiricism. Laurence Bonjour explains why this is so:

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661 John Kounios, Mark Beeman, The Aha! Moment: The Cognitive Neuroscience of Insight, Current Directions in Psychological Science (2009) 18: 210–216.

662 John Kounios, Mark Beeman, the Eureka Factor: Creative Insights and the Brain, London, Windmill Books, 2016, p. 131.

"*According to rationalism, a priori justification occurs when the mind directly or intuitively sees or grasps or apprehends (or perhaps merely seems to itself to see or grasp or apprehend) a necessary fact about the nature or structure of reality. Such an apprehension may of course be discursively mediated by a series of steps of the same kind, as in a deductive argument. But in the simplest cases it is allegedly direct and unmediated, incapable of being reduced to or explained by any rational or cognitive process of a more basic sort — since any such explanation would tacitly presuppose apprehensions of this very same kind. According to the rationalist, the capacity for such direct intellectual insight into necessity is the fundamental requirement for reasoning and reflective intelligence generally. Perhaps in part because it is taken by them to be so pervasive and fundamental, rationalists have typically had little to say directly about this capacity, focusing instead on more specific problems and issues and taking the general capacity itself almost entirely for granted. This in turn has lent support to the charge that there is something mysterious, perhaps even somehow occult, about the capacity in question.*"[663]

In short, the problem is that while everybody is familiar with the feeling of the Aha! moment in problem solving, there still is not enough scientifically substantiated explanation of what is really going on, so EAN could shrug it off wholesale as a vague psychological fact as opposed to logical operations, formulas and statements that appear to be so very concrete and sound. But we all know that revolutions in the mode of thinking do not usually happen in the way specified by analytic philosophy or logistic but by the very opposite of this conformist approach, i.e. a radical *re-interpretation* of the status quo, a decisive *turn*, a new *respect*. If we compare the intuitive, effortless, clear and adequately differentiated insight that Descartes describes in the *Regulae*, for instance, and the Aha! moment as described in the scientific investigations of Kounios and Beeman, the following picture emerges: Descartes describes *intuitive evidence* and *simple natures* as an *act of intuitive, rational insight* – "*seeing with the understanding*" – where in a pure act of our understanding, we become aware of basic and fundamentally simple but essential relations that could never be grasped empirically and through the accumulation of continuous *imperceptible* incremental steps because this, as we have seen, would lead to an *infinite regress*: extrapolating from B to C would require an intermediate step, and then another one if the leap from B to C cannot be thought "in one go," and so on, ad infinitum. For at some point, the sudden change from not knowing to knowing, "*from a state of not knowing how to solve a problem to a state of knowing how to solve it*" (Mayer 1992) – i.e. *insight* – must eventually occur, we must "see the light," or else there simply is no way for us to gain the knowledge in question. Descartes had realized this early on, perhaps even before he wrote his *Regulae*, primarily *in the process*

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[663] Laurence Bonjour, In Defense of Pure Reason, Cambridge University Press, Cambridge 1998, p. 15f.

*of solving geometrical problems*. It is one of the most important insights in all of his work and, thus, for rationalism as a whole. In the *Regulae*, Descartes offers the following definition:

"*By intuition I do not mean the fluctuating testimony of the senses or the deceptive judgement of the imagination as it botches things together, but the conception of a clear and attentive mind, which is so easy and distinct that there can be no room for doubt about what we are understanding. Alternatively, and this comes to the same thing, intuition is the indubitable conception of a clear and attentive mind which proceeds solely from the light of reason. Because it is simpler, it is more certain than deduction, … Thus everyone can mentally intuit that he exists, …, that a triangle is bounded by just three lines, and a sphere by a single surface, and the like.*" Later he also specifies the how of this intuitive seeing: "*… because two things are required for mental intuition: first, the proposition intuited must be* clear and distinct*; the whole proposition must be understood* all at once, *and not bit by bit.*"[664] (my emphasis)

What is at once obvious is a certain affinity with the four features of the Aha! moment listed above. But let's first once more make it quite clear that Descartes rejected "*the fluctuating testimony of the senses or the deceptive judgement of the imagination*" as a basis for cognition, that is, both the empiricist *sense experience* and the illusion of "*the imagination as it botches things together*." It is of the essence for understanding my present intention that at this point, Descartes' method of gaining certain knowledge is presented as *visual* in nature, that it is neither "silent inner speaking" nor "spiritualized" reasoning that transcends sensory perception. Rather, with Descartes' examples (triangle, sphere), cognition is presented as *visual insight* – something for everyone to "*mentally intuit*" – and posited as *visual thinking*, even though Descartes speaks of it as a "proposition," that is, a linguistically framed *insight*! Then again, when referring to the *ideas* he can perceive in himself, Descartes states "*that the ideas in me are like images which can easily fall short of the perfection of the things from which they are taken …*," so there is indeed a place also for figurative imagination in his mode of thinking, without its being an exact copy.[665]

In other key passages of his work, however, he refers to other, non-visual and non-geometrical *intuitive evidences* that he can perceive in himself. In the *Regulae*, for instance, he describes the knowledge that he exists as an immediate intuitive insight. Now this type of insight obviously differs fundamentally from the insight that there are three lines to a triangle.

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664 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 15 and 37.

665 René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 29.

Even the knowledge of himself in the "cogito" is, as has been often discussed, not the result of deduction but an *intuitive insight*. But *clearness* and *distinctness*, the truth criteria for any insight, originate in *visual thinking*, and Descartes also tells us that he had discovered *intuitive evidence* as the grounding of insight when he was solving *geometrical problems* but, then, went on to extend this mode of gaining insight to all fields of cognition! Language itself offers abundant evidence for the origin of thinking in the realm of vision: to *see* (= understand), *make evident*, *clarify*, *enlighten*, *elucidate*, all these are synonyms for *cognition through thinking*, and in *evidence* itself, there still is "*videre*." So, for the sake of clarity, let's once more emphasize that the *visual turn* is not about *imagination* or visual habits, but *visual thinking without language*! Descartes, too, is quite unambiguous in this respect:

"*And so something which I thought I was seeing with my eyes is in fact grasped solely by the faculty of judgment which is in my mind.*"[666]

What's so intriguing in all this is that Descartes nevertheless uses visual examples to describe *insight* or *intuitive evidence*, that his "judgment" is the result of geometrical considerations and geometrical reasoning, and that he may well have discovered this fundamental process when dealing with *geometrical examples*. Descartes kept fluctuating between these two in his philosophy in general because while he felt the proximity and elementary nature of *visual thinking* he at the same time became increasingly aware that if he wanted the *res cogitans* to bring to bear its full potential also in the domain of abstraction, he needed to go beyond visual thinking. The above quotation describes insight and cognition *in general*, and although both *evidence* and *insight* show the linguistic marks of their origin, and although Descartes in his *Regulae* presents a plethora of visual examples and uses numerous *graphs* as an illustration he must at some time or other have realized that while visual thinking was a fundamental precondition for us to attain thinking at all, visual thinking alone was insufficient to account for the world of linguistic-abstract insights. This is why he had to look for an even more fundamental anchoring, namely by positing the link with the self-conscious ego, with transcendental consciousness, a strategy he later pursued and brought to bear in the core issues of the six Meditations.

Perhaps it was this very insight that made him leave the *Regulae* unpublished even though to his last writings he never reneged on the basic elements and convictions of his argumentation there, for instance the criterion of *clear* and *distinct* insight and the presence of *innate* faculties.

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[666] René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 21.

Nevertheless, the majority of our cognitions and insights is arguably abstract, or only to be gained by linguistic means, and that is precisely the crux of the matter. To paraphrase a famous quotation, there is simply no way (be it evolutionary or systemic) for us *to attain conceptual thinking without visual thinking, and yet, to fully meet the requirements of reason, we cannot make do with it but must proceed to conceptual thinking, just as this was later spelled out by Kant*. This peculiar *intermediate position* of *visual thinking* is precisely what has led to both the confusion of all previous philosophy with regard to perception and the potential solution which, without wanting to anticipate, we can suddenly see quite clearly: due to the evolutionary history of early man, described in the first chapter, we are capable of solving very elementary tasks, for instance simple mechanical or geometrical ones, without recourse to language. We are able to visually-imaginatively carry out certain operations and construct relations and new forms, for instance turn and rotate objects in our imagination and spontaneously find technical solutions by visually thinking *of* these representations. Thus, simple problems can be solved, which is much more than mere "seeing" but a primal form of the understanding that I have called the *understanding of function* ("that's how to do it"), for instance concerning basal practical activities, levers, etc. Nevertheless, we should keep in mind that this *understanding of function* must have been the basis for *visual thinking* to develop which, in turn, became the basis for the development of language since about 50.000 BC, and thus of conceptual thinking as the superior new form of thinking, the *concept of function*. Nevertheless, we still have this method of visual thinking that is evolutionarily older, and more adequate for solving visual problems.

From this, we need to distinguish the "*insight*" that is gained in the Aha! moment. In some of its aspects, this form of insight is similar to that of "intuitive evidence" since it is about an act that occurs *all at once* and results in an *insight* that is *clear* and *distinct*. In others, it is different since it may happen not immediately but perhaps only after some time, at a different place, or even in a dream. Thus, it accounts for the possibility of gaining sudden insight into a complex problem while Descartes' *intuitive evidence* is a strictly "one-step" process. Also, the Aha! moment comes with a sense of pleasure. Considering that in the course of evolution, nature has associated the process of reproduction that is essential for survival with a strong *sense of pleasure*, one wonders whether evolution might have also provided a reward in terms of a sense of pleasure, albeit a more moderate one, for the creative insight into new connections, that is, into new and previously non-existent knowledge! In the case of the chimpanzee in his cage, this non-linguistic visual process of sudden insight resulted in additional food. Also, in the introductory chapter on evolutionary biology, I have pointed out that early humans, in particular in the

period of homo erectus, or heidelbergensis, and Neanderthal man, were able to craft their tools, go hunting and solve problems without the use of language, which can only have been possible through visual problem solving, that is, *visual thinking*. They were obviously able to invent a new *function* (e.g. see the advantage of having stone tips fixed to their spears) without having the linguistic concept of function.

This means that they must have had an *understanding of function* of some kind, for there is no other way of explaining these achievements. In the same vein, Karl Duncker noted as early as in 1945 that with certain practical problems, the solution often involves using an object in another-than-usual *function*. Here, the restructuration of the problem consists in departing from the well-known function of an object, taken for granted due to drill ("Abrichtung," Wittgenstein) or inculcation and "training on the part of society" (Quine), and assigning it a completely novel, often unexpected or inventive one. This important way of restructuring was also highlighted by Schooler and Melcher in "*The Ineffability of Insight*."[667] Thus, the individual argumentative strands of the *visual turn* begin to fit together, and it becomes evident that in the consciousness of man, something quite essential has been going on. Besides the innate *organization* of our perception by the *laws of gestalt theory*, we also seem to have a *visual understanding of function* that enables us to gain sudden insights and solve very simple practical problems and experience a sense of pleasure as a "reward." After all, the examples of restructuration offered by Duncker are mostly *visual* in nature, or at least solvable at an *understanding-of-function* level, e.g., simple levers, the rethinking of a diagonal, the unusual use of a stone tool.

### Are the laws of vision learned or innate?

Another important point is mentioned in passing by Gregory, namely that the laws of vision, that is, *how* we interpret and reconstruct the world when seeing it, are *innate* (*inherited*); a statement he at once seeks to take the edge off by saying that some of them may also be learned. Far from denying it, I strongly believe that while there is a significant element of innate knowledge, a large part of our visual habits also needs to be learned. It is not for nothing that the school of gestalt theory posited a "*law of experience*," i.e. the fact that once we have identified, for instance, a camouflaged object we can't help seeing it every time we look, we can't visually think it away any more. But *empiricism* has always insisted that

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667 Jonathan W. Schooler, Joseph Melcher, The Ineffability of Insight, in: Steven M. Smith, Thomas B. Ward and Ronald A. Finke, The Creative Cognition Approach, Bradford Book MIT Press, Cambridge/London 1995, p. 101.

there is no innate knowledge at all and that all knowledge originates from sense experience *alone* (Locke, A.J. Ayer et al.), so once even a single form of knowledge is found to be innate, which is evidently the case here, this empiricist dogma is refuted. Moreover, there are also many other kinds of innate knowledge, so the downfall of empiricism is not limited to the domain of *vision*; but more on this later.

Stephen Palmer describes what sense experience alone would be like if there was no form of organization whatsoever, which spontaneously brings to mind Kant's metaphor of the "*rhapsody of perceptions*":

"*Perhaps the best description is that visual experience without any organization would be like watching a snowstorm of swirling, multicolored confetti resulting from the output of millions of unrelated retinal receptors. Perceptual theorists in the empiricist tradition typically suppose that this must be what a newborn infant experiences. Because empiricists believe that all visual structure is learned from experience, it follows that a newborn's world must be completely unstructured. The noted philosopher/psychologist William James called it 'a blooming, buzzing confusion'. (…) Recently, however, a number of fascinating and imaginative techniques have been developed that have begun to allow us to infer what the visual world of infants might be like. The more we find out, the more it appears that even newborns have certain kinds of perceptual organizations.*"[668]

Newborns indeed seem to have a certain *innate* organization of their field of view, although their innate visual faculty of course also quickly develops through experience within their first year of life. Gaining experience here means synchronizing visual information with the information provided by the sense of touch and other sensory perceptions, that is, learning to understand and coordinate the delta between the individual senses. But while due to the brain's plasticity, the innate basic structure develops in response to the stimulation provided by the environment, this development must of course remain within what I propose to call the *range* of the innate faculty. What I mean by this is that the naturally innate equipment defines the limits, the "range," as it were, within which the mental structures (due to the typical plasticity, referred to above, of the neuronal tissue) can develop in accord with the innate structures. Within this range, *stimulations*, both random and educational, determine the way and the direction certain innate domains evolve, more and better, obviously, in the case of a child benefitting from the encouragement of a friendly and supportive environment, but not completely different. To explain what I mean, here's simple example: the innate anatomical endowment of an athlete's body affords him a certain range within which to throw a disk. But there are innate affordances that will always restrict the range of his

[668] Stephen E. Palmer, Vision Science, Bradford MIT Press, Cambridge London 1999, p. 255.

anatomical-physiological potential, training effects included, to under 100 meters (at least for humans as we know them). How the throw is effected, what throwing technique is used, etc., depends on the thrower's initiative, on national sports promotion programs, sports science, and training tailored to his needs as defined by the interplay between mind, body and the environment. Yet the innate faculties do not allow for throws of more than 100 meters, or with a 100 kilograms disk. I will discuss this in more detail in the chapter on innate knowledge; here it is just an example for the way the visual faculty develops, enabling it to enjoy the entire wealth of the colors we can see because it is equipped with the respective receptors and guided by the laws of gestalt, yet fundamentally barred from extending its "range" to the ultraviolet or infrared spectrum.

Now, we know that the physical image on the retina, that is, the actual physical stimulation of the retina by the photons and light waves that come streaming in, is *upside down*, *right-left inversed*, and *two-dimensional*. So, obviously, this is the image the newborn "sees" before the cognitive system starts to revert, that is, "rethink" it. But since infants also have some difficulty with near vision and distance vision, real "seeing" does not happen before the age of one, a peculiar fact that used to be hard to explain. Due to a shift of perspective, however, this explanation has become easier, as Gregory (under the heading of "The intelligent eye") explains:

"*Some puzzles of vision disappear with a little thought. It is no special problem that the eyes' images are upside down and optically right-left reversed-for they are not seen, as pictures, by an inner eye. As the Image is not an object of perception, it does not matter that it is inverted. The brain's task is not to see retinal Images, but to relate signals from the eyes to objects of the external world, as essentially known by touch. Exploratory touch is very important for vision. It matters that touch-vision relations remain unchanged. When changed experimentally (with optically reversing prisms, or lenses or mirrors) then a problem is set up, and special learning is required. No special learning is needed for a baby to see the world the right way up.*"[669]

It thus turns out that the essential learning model for vision is spatial "control" by touch since the latter is neither upside down nor right-left inversed. Thus, from the very start, we learn to put our trust primarily in the sense of touch, in what is palpable. This means that the infant needs to "totalize" all the sense experiences provided by these systems, the sense of touch (sound) and visual perception, in a way that enables him or her to interpret the visual information in accord with the information provided by the sense of touch and the other senses. The tendency to organize the reference points of reality in certain gestalts and, thus, make the world

[669] Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 5f.

"readable" implies a gigantic computational performance of the brain and explains why more than half of its capacity is indeed taken up by "vision." But this also means that objects are never simply copied such as they are *in themselves* but, as formulated so pointedly by Kant in the *Critique of Pure Reason*, "as products of our own thought imposed upon experience" – first imposed at the level of vision by the imagination according to the laws of gestalt and relying on an innate biological functionality, and then once more imposed in terms of concepts, i.e. according to the rules of the understanding.

The biological functionality that enables our visual cognition to overcome the *impossibility of visual perception* is largely based on the correct perception of *surfaces*, which *vision science* sought to explain by the "*generic-view principle*" in addition to the *laws of gestalt theory*:

"*We live in a three-dimensional world, full of objects resting on various surfaces. As visual creatures we rely on reflected light to obtain information from the world around us. (…) Thus in general, surfaces constitute the only visual accessible aspect of our world. We cannot, for example, obtain visual information from the interior parts of ordinary objects. Yet even the surfaces of objects are not fully accessible to us as observers. Surfaces occlude other surfaces.*"[670]

To solve this interpretive problem, our visual faculty relies on a method that is called *generic-view principle*:

"*When faced with more than one surface interpretation of an image, the visual system assumes it is viewing the scene from a generic, not an accidental, vantage point.*" (loc. cit., p. 60)

Interestingly, this mechanism is so pronounced and so powerful that it makes us invariably see well-known impossible figures and objects such as the tri-bar (the *Penrose triangle*) or Escher's paradoxical drawings as illusions and that even experience does not help us to keep these impressions at bay. At this level, the biology of vision overpowers our understanding:

"*Our surface processing is so powerful and autonomous that it generates an object we can't even conceive of. Furthermore, even when we have just seen and touched the tri–bar, our recent experience with and knowledge of the real object is of no help in resisting the generic-view interpretation.*" (loc. cit., p. 61)

Richard Gregory now elaborates on the idea of the *organization of the field of vision* from a strategic point of view:

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[670] Ken Nakayama, Zijiang He, Shinsuke Shimojo, Visual Surface Representation: A Critical Link between Lower-level and Higher-level Vision, in: Stephen Kosslyn, Daniel Osherson (Eds.), Visual Cognition, Vol. 2, Bradford Book MIT 1995, p. 62.

"*If the brain were not continually trying out organizations of data, for searching for objects, such as faces, the cartoonist would have a hard time.*" (loc. cit., p. 6)

This idea could be creatively extended by interpreting the physical image, the stimulus pattern of the retina, on the one hand, and the *interpretive patterns* that, relying on the laws of gestalt theory, act on the visual image and transform the physically "given" into the images we actually see, on the other, as *surface structure* and *deep structure*, respectively. For *visual thinking* may indeed have gradually evolved from these gestalt patterns, which would definitely make sense. If the *gestalt laws* indeed "constrain" us to complete the badly drawn circle of irregular dots we see, this would be the first step – based on an *understanding of function* and with, initially, no need for a linguistic concept – towards *visually thinking* it as a geometrical figure. At the same time, this would mean that the patterns of visual thinking, that is, the *grammar of vision* – under the assumption that there is a *temporal sequence* from the *gestalt laws of vision* to the *understanding of function* to *visual thinking* to the *concept of function* – must have influenced the formation of the *universal grammar* of language. Thus, an evolutionary line would emerge from the *laws of gestalt*, the *grammar of vision*, to *visual thinking* to *universal grammar*; which, in turn, would explain the successful language-to-world adaptation by the interpretive performance of the visual system (the important idea of a *grammar of vision* will later be discussed in more detail). In terms of human evolution, this sequence would be: enhanced importance of seeing and of the hands, i.e. of touch (in contrast to the senses of smell and hearing in other species), first enormous growth in brain size due to the development of *visual thinking* and formation of the laws of vision (laws of gestalt), followed by a second growth in brain size brought about by the development of language from visual thinking due to the transformation of visual thought processes into linguistic ones. This would also be well in line with the sequence of early humans and the anatomical changes that occurred in the relevant periods. Thus, the entire mental development of man can be explained in a way that is logical and coherent as well as plausible.

When we start to apply the modern theory of *vision* to Plato's and Descartes' doctrines, we already know that if our senses may at times deceive us[671] (the round tower, the "broken" oar in the water, the example of the sun, etc.), this is precisely because of the many assumptions and corrections involved in the interpretation of the retinal image. Gregory confirms the doctrine of rationalism:

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[671] René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 55.

"*Vision is certainly not infallible. This is largely because knowledge and assumptions add so much that vision is not directly related to the eyes' images or limited by them – so quite often it produces fictions. This can be useful, as images are inherently inadequate, but visual fictions, and other illusions, worry philosophers seeking certainty from sight. How did such complex processes for representing things start? What is their evolutionary benefit?*" (loc. cit.)

From a perspective of rationalistic Neo-Kantianism, this leads to a further question, namely, what would be the evolutionary advantage for a living being of relying, rather than on copying, on the interpretation and construction of scenes and objects from physical points of reference according to gestalt laws. Gregory offers a plausible explanation:

"*These brain representations are far more than pictures. They include information of what various kinds of objects may do, or be used for. For behaviour to be appropriate in a wide variety of situations requires a great deal of knowledge of the world. Knowledge must be selected and accessed within a fraction of a second to be useful for perception, or the moment for action (or survival) will pass. So the intelligence of vision works much faster than other problem solving. This may be why perceptions are quite surprisingly separate from generally more abstract conceptions, and may disagree. Thus, one experiences an illusion, though one knows it is an illusion and even what causes it. Illusions tell us a great deal — sometimes, as I shall show, more than we would wish to know!*"[672]

Thus, image construction needs to happen very fast, instantly, since this function may be crucial for survival and, what is more – these images are not just copy-like pictures (the "impressions" of the empiricists come to mind, or the EAN tenet of "direct" perception) they are *constructed hypotheses* and, furthermore, contain information "*of what various kinds of objects may do, or be used for*." Now, instead of Hume's naïve "inner film" there is not only a heuristic process of interpretation; there even seems to be a kind of *understanding of function* that is an integral part of perception itself. The fast and instantaneous interpretive work of cognition in constructing *hypotheses* and objects from retinal stimuli is extremely important for survival, so its action needs to be very fast, as Gregory emphasizes:

"*… the eyes' images are almost useless for behaviour until they are read in terms of significant properties of objects, and because survival depends on behaviour being appropriate to the immediate future, with no delay, although eye and brain take time to respond to the present.*"[673]

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672 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 8.

673 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 10.

So, we now also understand why the visual processes, as well as *visual thinking*, need to operate extremely fast: they need to ensure this instantaneous response. These visual insights are fast and effortless because something "*clicks*" that for a very long time has very reliably and successfully developed in the course of evolution.

In astronomical contexts, however, interesting phenomena can be observed that are due to the gigantic distances between the celestial bodies. Thus, the sun, for instance, can still be "seen" *for eight minutes* after it has actually "set." This means that the light rays that stimulate our retina do not correspond to the actual position of the object but to the sun such as it was eight minutes ago. It could actually have exploded in the meantime while our "*sense experience*" would still perceive it as existing. For rationalists, this is not a problem since they are not slaves to their sensory impressions and the object "sun" is, anyway, conceptually grasped by the combination of *both* ideas, the idea provided by the perception and the idea provided "only" by thinking. But what is much more interesting in our context is that due to the physiological organization of our retina, all we can perceive of the huge range of waves of the electromagnetic spectrum between radio waves and gamma rays is a very limited range of frequencies between about 400 and 700 nanometers.[674] This range is above that of infrared and below that of ultraviolet light and spans less than one octave. What we perceive of the sun in terms of sense experience is, therefore, actually just a small section of its radiation. The human eye is adapted to this section, i.e. to the light conditions needed for human beings to be able to perform their most important activities and, thus, to survive. The wavelength, in turn, is highly important insofar as it determines the limit of the eyes' *resolution capacity*, not unlike in a camera:

"*Eyes are adapted to accept wavelengths of maximum energy of sunlight, without undue damage to the biological materials of which they are made. Compound eyes of insects work in the ultraviolet, no doubt because they are so small.*"[675]

We again see that depending on their evolutionary stage of development, different living beings "see" in rather different ways, that is, perceive the world differently depending on the size of their sense organs and the structure of their eyes and retina, or may even have developed quite different sense organs, for instance bats. The degree of adaptation to the physical und biological requirements and the complexity of the functions involved, however, quite undeniably attest to the evolutionary logic of these natural perceptual systems, a fact that needs to be taken into account when considering the emergence of *visual thinking* in man. But

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674 Jörg Sczepek, Visuelle Wahrnehmung, Norderstedt 2011.

675 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 21.

image formation does not only depend on the stimulation of the retina (today, the retina is functionally classified as brain tissue) and the generation of the upside-down, two-dimensional, right-left-inversed image by the interplay of lens, iris, width of pupil, eye muscles, etc.; it also depends on the *movement* of the eyes. This needs mentioning here, and for a very important reason, since it is crucial for our understanding of our *faculty of imagination* and the actual power and functionality of our figurative imagination. The *movements* of the eyes are controlled by six closely cooperating muscles and consist of *two types*: when we look at an object directly, our eyes move in small leaps that are called *saccades*. But when looking means tracking a moving object, eye movement is smooth. *Saccadic* eye movement has been relatively thoroughly researched, and there are some very impressive graphics that reconstruct the pursuit movements and points of fixation, for instance when viewing a picture.

The reason why the eyes move in *saccades*, that is, permanent little leaps or to-and-fro movements when looking at objects rather than statically fixate on one point is a biochemical one: fixation would mean ongoing stimulation of the same receptors, resulting in rapid biochemical exhaustion and a rapid smearing and fading of the image. So, this is why there are these permanent micro-movements and saccades: they need to counteract the so-called local adaptation. Now, we know – and can, for once, really verify by "self-observation" – that when we try to imagine an object or a face (e.g. with our eyes closed), we can "retain" this "*image*" only for a short time in the eyes of the mind. It keeps slipping, and we keep "rebuilding" it in the imagination. The images and imaginations, the representations philosophers from Plato to Augustine to Descartes to Hume to Kant have referred to, are precisely this: biochemically coded imaginations that are constructed and can, in a sense, be for a short while contemplated in the "eyes of the mind."

And here we come to the point, crucial also for a better understanding of philosophy, of why this is always possible for just a few seconds: the incapacity to retain a certain object in the imagination and observe it with "the mind's eye" for more than perhaps a few seconds is physiologically linked to the mechanism of the saccades! This is anything but a minor fact for it proves, first, that from an evolutionary point of view, our entire *imagination* has evolved from *visual perception*; that, therefore, *imagining thinking originates* from the process of seeing; that this visual thought process of imagining was, later on, also the basis for the evolution of language; and that even *imagination* in the Kantian sense, i.e. the synthetic faculty of imagination, has its origin in the process of seeing. The innate functionality of "seeing" in saccades is the reason why "imagining," being derived from it, cannot retain the image, that is, the biochemical coding by which it has been generated in the "eyes of the mind"

for more than a few seconds. It seems that even the *rhythm of thinking*, the *sequence of representations* and *thoughts* might depend on the movements, the rhythm and integration of the physiology of seeing and, thus, the imagination. At the same time, this evolutionary-physiological framing of the *power of imagination* means that there is a limit not only to the time we are able to retain an "image" in the "eyes of the mind" but also a definite limit to our capacity of retaining an *exact* image. We are capable of clearly imagining objects and have a life-long memory of certain scenes, but the image will always be somewhat instable and blurred in terms of borders, colors, forms and details. This fact is extremely important for our discussion of the possibility of *universal representations*, most notably as an argument against Berkeley's and Hume's theory of abstraction and their assumption of individual representations of copy-like precision.

*Stephen M. Kosslyn*, in particular, has done extensive scientific research in the field of mental imagery. He could show that images are primarily "produced" in those areas of the brain that are dedicated to *pattern* perception. These brain areas are topographically organized, that is, tend to retain the *geometrical structure* of the perceived image structures. Experiments with animals have shown that what can be observed in their brain when they are looking at cross-shaped structures, for instance, is a topographically cross-shaped activation of brain areas that is modeled on the pattern they see; there is an "isomorphism" that is really most impressive. Now, these topographically organized image structures in our brain are also the basis of our representations, which raises the problem, already described, that due to the physiology of seeing, the topographically organized images are of short-term stability:

"*However, because the imagery system draws on mechanisms used in like-modality perception (…), it relies on such physically topographically organized structures. As we argue, many of the properties of imagery arise because of this simple fact. For instance, because the input to early topographically organized areas* changes every time the eyes move, *the patterns of activation within them cannot linger for long; if they did, the world would seem smeared as we moved our eyes. But what is a virtue for perception is a drawback for imagery: …* it is difficult to maintain images for long, in part because they rely on neural machinery also used in perception (my emphases). *… An object-based image begins to fade as soon as it is formed. The fact that such images fade quickly makes sense if they share the same topographically organized occipital cortex used in visual perception. …one does not want smearing every time the eyes move and a new image is projected into the cortex…This same property implies that object based mental images also will be difficult to retain. One can maintain such an image by re-activating the visual memory representations in the object-properties-processing subsystem.*"[676]

[676] Stephen M. Kosslyn, The Case for Mental Imagery, Oxford University Press, Oxford 2006, p. 17 and p. 145.

Now we understand why we can "retain" images only for such a short time in our imagination and have to keep "uploading" them. Producing a one-hundred-percent copy is virtually impossible, which alone suffices to show that it is surely impossible for Hume to *exactly* picture his room from memory, with his eyes closed. The simple presence of a pile of unwashed laundry in his room would put an end to any *exact copying* of *impressions* to *ideas*! Hume's copy theory, and with it all that follows from it in his system of copied "*impressions*" – is again revealed as completely unscientific and wrong.

But what is crucial here, from a philosophical point of view and for the present study, is the fact that the copy-like method of imagining that Hume, following Berkeley, sets forth in his *theory of abstraction* leads to insuperable difficulties. We have seen that this theory was already invalidated by Russell who argued that although the objects we imagine are always rather imprecise, vague and maybe even washed-out, we do retain their *universal character* (i.e. an imagined triangle must have three corners and three sides, all the other details are, for the time being, irrelevant with respect to the essence of the triangle). Hume's claim is, after all, that we can always only imagine an *individual and exactly describable object* that can never be *universal* per se but always functions as a *representative*, an individual triangle that represents "other triangles." Like Berkeley, he chooses to illustrate his claim by a specific (e.g. acute) triangle because this is an object that can (allegedly!) be imagined with relative precision, rather than a pile of leaves or laundry where this would already be much more difficult. Let's also not forget that in terms of his copy theory, we have to assume an analogous one-to-one copy of the respective object (in this case, a triangle). Russell, in contrast, argued (and here I go along with him) that due to the mechanisms described, we are definitely unable to imagine *exactly* copied objects. We are always dealing with rather *vague* representations which, nevertheless, suffice to represent the *essence* of the respective object. If, for instance, we hear the term "soldiers" and seek to produce the representation that goes with it, what comes to mind is not the precise photographical image of Peter, Paul and Jones in uniform but, rather, a schematic group of male *figures* in uniforms with military attributes. When using the concept "soldiers," we do not always imagine the exact same group of soldiers we once saw, it's not like a hieroglyph that is supposed to also represent all the other soldiers. Besides being completely absurd, this would be outright impossible because it is beyond the reach of the physiological power of imagination.

Stephen Kosslyn, one of the leading experts in this field, has conducted numerous empirical tests in an effort to obtain evidence for the role the imagination plays in the thought process, and to clarify these

processes themselves. Kosslyn describes the starting point of this debate as follows:

"*No one denies that people experience 'seeing with the mind's eye', but there is controversy over what this experience reveals about how the brain actually stores most information. Two means of representation have been proposed for mental images, one that confers a special status on images and one that treats them as no different in kind from the representations of linguistic meaning. The two alternatives are called depictive and propositional representation (see Kosslyn 1980).*"[677]

Essentially, the debate is about whether there is a single language of thought or, rather, *two systems* that may overlap or be parallel-connected:

"*At the core of the imagery debate is the claim that there is a single 'language of thought' (Pylyshyn, 1973), as opposed to the idea that cognition relies on multiple representational systems. Second, historically, from the time of Plato at least up to William James, philosophers and psychologists have relied on their introspection to argue that depictive images play a functional role in psychology.*"[678]

The issue, thus, is whether there is just one way for objects to be represented and understood in our imagination, namely linguistically-conceptually, or also a complementary, or parallel, action of representative imaginations and the interpretive systems that analyze them, in short: whether *visual thinking* is possible. The more general objection, with Zenon Pylyshyn as its most prominent advocate,[679] is that figurative representation can convey the *form* or *gestalt* but not the content of what is depicted. The usual answer to this is that we do not have a picture gallery in our consciousness, quite apart from the question of who is supposed to screen these "pictures" – one would get engulfed in an infinite regress. Another objection concerns the quality of the images, e.g. that we cannot count the stripes of an imagined tiger and that, therefore, visualization and the imagination in general is something of a *fata morgana*, and language-based thinking the one and only reliable mode of representation. But this is in contrast to the personal experience of every human being who is perfectly able to visualize his or her children, partner, home, or just some vacation memories without having to resort to language; while, on the other hand, there are a number of fields where conceptual thinking cannot compete with the richness of the "imagery." An example is *face recognition*. Cognition research suggests that face recognition relies on

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677 Stephen M. Kosslyn, Mental Imagery, in: Stephen Kosslyn, Daniel Osherson (Eds.), Visual Cognition, Vol. 2, Bradford Book MIT 1995, p. 280.

678 Stephen M. Kosslyn, The Case for Mental Imagery, Oxford University Press, Oxford 2006, p. 21.

679 See Zenon Pylyshyn, What the mind's eye tells the mind's brain. A critique of mental imagery, Psychological Bulletin, 80, p. 1–24. More recently: Seeing and Visualizing, Bradford MIT Press, Cambridge/London, 2006.

other brain modules than those involved in normal object recognition. Face recognition is an extremely complex and amazing achievement of visual cognition since human beings are able to recognize a person among thousands of others, often with nothing to rely on but a brief glimpse of a face or a brief encounter. Only the most cutting-edge computer programs dedicated to face recognition are beginning to draw level with the performance capability of evolution. Interestingly, in his later writings where, in the systemless fragments that characterize his reasoning, Wittgenstein offers some gestalt theory-inspired reflections on "seeing as…," he also considers face recognition:

"*Now when I know this person in a crowd, perhaps after looking in his direction for quite a while – is this a sort of seeing? A sort of thinking? The expression of the experience is 'Look, there's …!'*"[680]

I quote Wittgenstein here primarily to once more highlight the alternation between "*seeing*" and "*thinking*" which could be construed as a direct indication of his groping towards *visual thinking*.

The capability of face recognition seems to be located in the right brain half, and since it clearly functions in infants even before language acquisition it must be part of our *innate knowledge*:

"*Infants are born with a preference for gazing at faces rather than other objects. At just thirty minutes of age, they will track a moving face farther than other moving patterns of comparable contrast, complexity, and so on (see Morton and Johnson 1991).*"[681]

The issue of face recognition is an interesting touchstone also in the debate (between Kosslyn and Pylyshyn) about whether content is represented pictorially or propositionally. Imagine a border official having to *identify* people by linguistic descriptions rather than passport photos – the height of absurdity! Schooler and Melcher quote the philosopher M. Polanyi (*The Tacit Dimension*) in this context: "*I shall reconsider human knowledge by starting from the fact that we can know more than we can tell…, Take an example. We know a person's face, and can recognize it among a thousand, indeed a million. Yet we usually cannot tell how we recognize a face. So most of this knowledge cannot be put into words.*"[682] In the chapter on *innate knowledge*, we will again discuss the fact – and important argu-

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680 Ludwig Wittgenstein, Last Writings on the Philosophy of Psychology, The University of Chicago Press, 1982, no. 571, p. 74e.

681 Martha J. Farah, Dissociable Systems for Visual Recognition, in: Stephen Kosslyn, Daniel Osherson (Eds.), Visual Cognition, Vol. 2, Bradford Book MIT 1995, p. 101.

682 Jonathan W. Schooler, Joseph Melcher, The Ineffability of Insight, in: Steven M. Smith, Thomas B. Ward and Ronald A. Finke, The Creative Cognition Approach, Bradford Book MIT Press, Cambridge/London 1995, p. 106. Michael Polanyi, The Tacit Dimension, University of Chicago, Chicago/London 2009 (1966), p. 4f.

ment against Locke's "attack" – that we do not need to be conscious of some *innate faculty* for it to qualify as *knowledge*. Based on empirical tests, Schooler et al. have shown that speech tends to interfere with and obstruct face recognition:

"*Consistent with this view, Schooler and Engstler-Schooler (1990) observed that verbalizing the appearance of a previously seen face markedly interfered with subjects' ability to recognize that face from an array of similar ones. Additional studies supported the interpretation that verbalization may emphasize verbalizable attributes of the stimulus while overshadowing the critical nonreportable information necessary for optimum performance.*" (loc. cit.)

Based on this insight, Schooler and Melcher go on to ask why, if language and speech (propositions!) are supposed to be the only form of our thinking, visual performance tends to be hampered by speech, why speech should have a negative impact on visual performance. The answer, as we see it, is comparatively simple: *visual recognition* and *visual thinking* are much older, much more archaic, than language and much more efficient and precise when it comes to tasks such as face recognition. Evolutionarily much more recent, language, or the activity of the speech centers, has other advantages and is, therefore, likely to interfere with visual tasks.

Noam Chomsky early on realized the importance of face recognition for his biological-Cartesian approach:

"*A person can recognize an enormous number of human faces and can identify a presentation of a single face with various orientations. This is a remarkable feat that cannot be duplicated with other figures of comparable complexity. It might therefore be interesting to try to develop a 'grammar of faces,' or even a 'universal grammar of faces," to explain these abilities. Perhaps, at some stage of maturation, some part of the brain develops an abstract theory of faces and a system of projection that allows it to determine how an arbitrary human face will appear in a given presentation. There is some evidence that face recognition is neutrally represented in the right hemisphere and that this neural representation is delayed until past the time when language is fixed in the left hemisphere.*"[683]

Cognition or, in the case of face recognition, *re-cognition* is a gain of knowledge brought about, independently of concept and language, by a specific visual system – it is a *visual-cognitive achievement without language*. Following my assumption that *visual thinking* must have existed long before any language, i.e. in a stone-age culture that successfully mastered all the relevant processes, it is highly probable that humans were able to visually recognize their relatives before they had any language. The *temporal succession* of, first, figurative representation and, then and much later, the emergence of language at about 50,000 BP, actually gives a

[683] Noam Chomsky, Rules and Representations, New York, Columbia University Press 1980, p. 248.

deathblow to the assumption of the propositional representation of imaginations, and it logically follows that we must have two systems of representation, a *visual* one – original, archaic but very fast – and a *linguistic* one – relatively late and much more complex and abstract but also slower!

For many decades Kosslyn, as mentioned, has been conducting numerous empirical studies dedicated to the in-depth exploration of "*depictive representation*." For instance, test persons were required to look at and memorize a simple drawing of an airplane for a certain time and, then, view this picture "in the mind's eye" and describe, from tail to prop, all the details they could see with this "mind's eye." Kosslyn describes this process as "*scanning*." The findings obtained in his test series were definite: *scanning* time increased with the *physical distance* between the individual structures and objects on the drawing, so the process of imagining clearly involved a spatial-figurative correlation. Similar findings had already be obtained in *Shepard and Metzler's* (1971) legendary experiments: when imagined forms or letters were rotated, rotating time increased with the widening of the rotation angle, with a maximum at 270 degrees. All these experiments show that when we are imagining something, we do it exactly in the way already discovered by Plato in terms of his concept of "the mind's eye" that allows us to consider a problem. Kosslyn:

"*It is important to realize that there is nothing paradoxical or incoherent in the notion of a 'mind's eye'. We can think of the mind's eye as a processor that interprets depictive representations (which in turn-somehow-ultimately give rise to visual perceptual experiences). When these interpretative processes are applied to remembered perceptual information instead of information that is provided online via the senses, an image rather than a percept will be experienced.*"[684]

And here we have come full circle back to Gregory's previously discussed insights about image generation being based on the principles of *gestalt theory* (we have not lost the thread of our argumentation, all this is part of the strategy!). For we were by then already aware that to interpretively construct the images we perceive from the incomplete input of retinal stimulations, the brain relies on certain patterns and laws in terms of gestalt theory. Now, in his scientific experiments, Kosslyn found that when it comes to analyzing our *mental imagery*, we also rely on standardized interpretive patterns that are *inherent* to us (Kosslyn does not explicitly use the term of "innate," so I will not use it here, either).

[684] Stephen M. Kosslyn, The Case for Mental Imagery, Oxford University Press, Oxford 2006, p. 40.

"*The point here is that we humans have default interpretive systems, which strongly bias us to interpret most patterns in specific ways. Just as we tend to interpret pictures consistently when revisiting them, we tend to interpret mental imagery consistently.*"[685]

But this means that if, as described, we rely on certain patterns to imagine and interpret our mental imagery, then everything we think in the form of figurative representations is analyzed and interpreted by certain "*default interpretive systems*." And since, like the systems that ensure the build-up of the visual image from the retinal image, these interpretive "processing systems" are for a large part biologically pre-installed, that is, have come into existence in the course of evolution, it logically follows that they are *innate*.

This is not to say, however, that certain interpretive patterns cannot, with time, overlap with innate patterns and that there may not be additional learned elements, as well. Perspective view (*central perspective*), for instance, and the deliberate use of scenography in art and architecture, in particular, is a cultural achievement of the Renaissance, even though there may of course have been artists in cave painting who *intuitively* used perspective in their works of art. But the majority of these fundamental imagining processes is surely *innate*, if only because the *saccades*, i.e. the permanent micro-movements of the eyes, are a biological automatism, which necessarily implies that the patterns for generating representations as well as the gestalt laws of image construction are innate, too. Kosslyn now tightens the noose:

"*The interpretative procedures that operate on depictive representations are very different from the procedures that interpret linguistic strings. For example, they do not have to enter a lexicon to identify the 'form class' of a symbol. As discussed, depictive representations do not bear an arbitrary relation to the thing represented, unlike descriptive representations. Information about an object is inherent in the pattern of the representation itself, is worn on its sleeve, as it were.*"[686]

In summary, what we can say is that *seeing* and *imagining* originate from *the same evolutionary sources* and are closely related in terms of their physiology and functioning. Both cognitive achievements follow certain patterns and laws that have been largely formulated and described by the laws of gestalt theory. Like the physiological bases of seeing and imagining, these patterns and laws are largely *innate* but need to be stimulated during the first months of life, failing which the functions will not optimally develop, if at all. Thus, the next strategic step towards the visual turn has come within reach: if *seeing* and *imagining* originate from the same evolu-

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685 Stephen M. Kosslyn, The Case for Mental Imagery, Oxford University Press, Oxford 2006, p. 52.

686 Stephen M. Kosslyn, The Case for Mental Imagery, Oxford University Press, Oxford 2006, p. 53.

tionary sources, and if the imagination, or the *power of imagination* in the Kantian sense, is the basis of synthesis, or representation and, thus, thinking, then a genetic line of development begins to show: *vision – representation – universal representation – power of imagination – schema – understanding of function – concept of function*, with the latter not being conceived of in terms of the mathematical function (Frege) or the concept of series (Cassirer) but in terms of *universal representation*, that is, *visually*, in the sense of the *visual turn*; which, then, is suggestive of Cassirer's later *concept of function* as expressed in the concept of *symbolic pregnance*. As for the relation between these two, some comments will be offered in the Excursus on Cassirer's concept of function at the end of this book.

## The emergence of visual thinking and the understanding of function

Before taking the next step, let's briefly recapitulate. When we look at an object or a landscape, the "image" we "see" in our mind is the result of various constructive interventions, i.e. interpretive procedures in the style of *gestalt theory*. At this point of our argumentation, many other mechanisms that also play an important role in the generation, processing and construction of the image – e.g. stereoscopic vision, eye convergence and accommodation, high and low visual acuity, motion parallax, object occlusion or interposition, central perspective, role of shadows, size perception, brightness and color, resolution and contrasts – have not yet been taken into consideration at all. But since these mechanisms, too, are instances of *active* cognitive construction rather than *passive* perception as posited by empiricism, I propose to deal with them later so as to be able to really work out the contrast here. We have seen that in a first step, the image we perceive is constructed in accordance with certain *innate laws of gestalt*. We have further seen that due to saccadic eye movement, which is a physiological necessity, the resulting "image build-up" in the imagination is very short-lived and that this is the reason why these images quickly fade and require permanent rebuilding. We have, then, shown that we can "scan" these images in our imagination, that is, view them in the mind's eye, and that there is a spatial-temporal correlation between the "spatial extension" of the image in the imagination and the scanning procedure. Kosslyn then provided the crucial indication as to *how* the "image analysis" is carried out "in the eyes of the mind," that is, how imagining processes in humans occur. Due to these processes, we are able to perform simple thought operations in visual contexts by relying on patterns of image recognition: having "turned and twisted" the respective objects in the imagination, we can "see," for instance, that a quadrangular handle will not fit into the

round hole in a stone axe. While this may not seem to be such a mind-blowing achievement, it may have been crucial for the survival of early man.

Kosslyn also advanced a very important argument to explain how the two systems of thought are mutually compatible and how *visual thinking* relates to *linguistic-conceptual thinking*. Which is contrary to the world of linguistic philosophy where the assumption is that there is *only one mode of thinking*, namely in propositions, and that the latter are directly linked to sensory impressions. But if we assume two systems of thought, this also raises a number of questions: How do these two modes of thinking relate, temporally as well as systemically? Do they overlap, do they join in synergistic cooperation, or do they even interfere with each other? Where do the two systems converge in the ego? Up to which point is there mere "imagining," "turning and twisting" one or several objects in the eyes of the mind, and where does "understanding" as a mode of problem solving kick in (wooden handle fits into stone)? Kosslyn tries to explain this by an example. Let's say we have two formats for obtaining geographic information, a map and a chart with intercity distances:

"*These two systems may be completely isomorphic to each other in all important respects, because either one can be generated from the other. Nevertheless, these two sorts of representations have clearly different properties. The map is a depictive representation, which makes it suitable for rapid geometrical computations; the chart of intercity distances is digital, which makes it suitable for rapid arithmetic computations. ... The 'efficiency' of a representation, then, depends in part upon the purposes for which one puts that representation. Given that different types of external representational formats lend themselves to performing different tasks, we can easily argue that the same is true for internal representations. By using different representations, tailored for the task at hand, the system gains in efficiency.*"[687]

Although I do not think that the systems are isomorphic and that either one can be generated from the other – since for practical use, charts are no substitute for the information provided by a map, and numerical codes no substitute for a landscape (except for computers) -, the rest of his argumentation is very plausible. Some 50,000 years ago a linguistic system *developed from the already existing visual system*. Both have their advantages depending on the requirements of the task at hand but serve the same ego, the same reason. And the cognitive system "gains in efficiency" by this, as Kosslyn writes. This, too, is substantiated by empirical studies. Helstrup and Anderson could show that, firstly, solving geometrical problems or assembling a puzzle from the elements provided can be easily done by *visual thinking* and that, secondly, doing this the visual way is

[687] Stephen M. Kosslyn, The Case for Mental Imagery, Oxford University Press, Oxford 2006, p. 54f.

*more efficient* than any language-based way could ever be.[688] What is more, verbalization may even interfere with the solution of visual tasks, as subsequent studies revealed:[689]

"*The finding that verbalization disrupts insight processes suggests two implications for the age-old issue of the relationship between language and thought (for a recent review, see Hunt & Agnoli, 1991). First, the finding that subjects are less effective at solving insight problems when they are compelled to put their thoughts into words provides additional support for the claim that insight involves processes that are distinct from language. Second, the observation that verbalization qualitatively alters performance suggests one situation in which insight problem solving may become increasingly influenced by language, namely when subjects attempt to articulate their thoughts. In short, the present research suggests that the relationship between language and thought is not always symbiotic. Rather, in some situations, language may interfere with thought.*"[690]

Incidentally, this observation is fully consistent with the mode of thinking in chess where speaking tends to disrupt visual thinking, but more on this later. The observation that language, our most important analytical instrument by far, clearly stands in the way of efforts to decipher or restructure a visual context, interfering with the solution of the problem and putting constraints on thinking, was also made in a number of other domains. In "The Act of Creation," Arthur Koestler already made it clear that language was ideal for crystallizing vague and unclear thoughts but that as a consequence, these crystallized thoughts were no longer fluid! Language, he argued, certainly was an instrument of unparalleled brilliance but could also interfere with the creative process:

"*Among all forms of mentation, verbal thinking is the most articulate, the most complex, and the most vulnerable to infectious diseases. (...) Language can become a screen which stands between the thinker and reality. This is the reason why true creativity often starts where language ends.*"[691]

Schooler and Melcher refer to studies on *face recognition* which show that verbalization will disrupt the process of recognition, as well as to similar effects in other domains:

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688 T. Helstrup & R.E. Anderson, (1991). Imagery in mental construction and decomposition tasks. In: R.H. Logie & M. Denis (Eds). Mental images in human cognition, Oxford, England North-Holland 1991, p. 229–240.

689 M.A., Hitch, G.J., & Bishop, D.V., Verbal recoding of visual stimuli impairs mental image transformations. Memory 6- Cognition, 20, 1992, p. 449–455.

690 Jonathan W. Schooler, Stellan Ohlsson, and Kevin Brooks, Thoughts Beyond Words: When Language Overshadows Insight; Journal of Experimental Psychology: General 1993, Vol. 122. No. 2, 166–183.

691 Arthur Koestler, The Act of Creation, Picador Pan books, London 1975, p. 177.

"*Similar disruptive effects of verbalization have been observed in a variety of other domains hypothesized to rely on nonreportable processes or information, including taste judgments (Wilson and Schooler 1991), aesthetic evaluations (Wilson et al. 1993), visual imagery (Brandimonte, Flitch, and Bishop 1992), and implicit learning (Fallshore and Schooler 1993).*"[692]

*Non-linguistic thinking* has thus been shown to generate insights, or what I have called the *understanding of function*. We just "*see*" how a *simple mechanism* or a simple object "*functions*," there is no need for us to resort to linguistic-conceptual thinking. This is more than just *visualizing* how, for instance, one or several objects need to be rotated in space, or in which direction they can be moved, it is the imaginative understanding of the *effect* an object will have, that is, of its *function* – e.g. the effect of a blow with a stone axe or a hatched or some other missile –, it is the understanding of how to perform a move and what its effect will be. So this is a mode of thinking that is much simpler and much more primitive than linguistic-conceptual thinking but nevertheless enables us to solve simple problems. And let's not forget that all these simple mechanisms were *functionally* understood well before man had so much as even the first rudiments of language.

Furthermore, there are domains or activities that must of necessity have been based on a visual *understanding of function* since insights were definitely gained without language as we know it – e.g. that sharp stones will cut better than blunt ones, how to construct simple dwellings, the use of elementary levers. This *understanding of function* was obviously the prestage of *visual thinking* as well as the basis for its gradual development. Increasingly complex problems could be solved without language since thinking developed from the visual (rather than acoustic or tactile) domain. Thus, we can reconstruct how thinking, well before language was even possible, gradually evolved from the visual domain and the *gestalt laws* into a *grammar of vision* and, then, into *visual thinking* and its *understanding of function*. This is the reason why visually navigating the digital symbols, icons and imageries of a graphic user interface seems so familiar, and this is what the visual metaphors in our language undeniably show. There is, of course, no doubt whatsoever – and the simultaneous appearance of homo sapiens and language is hardly a coincidence – that when it comes to thinking in more abstract and more complex contexts, language alone is the adequate medium. But it should nevertheless be kept in mind that simple visual tasks can indeed by solved faster and maybe even more efficiently by visual thinking than by conceptual thinking. This being established, let's now turn to the other essential functions of vision, and

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[692] Jonathan W. Schooler, Joseph Melcher, The Ineffability of Insight, in: Steven M. Smith, Thomas B. Ward and Ronald A. Finke, The Creative Cognition Approach, Bradford Book MIT Press, Cambridge/London 1995, p. 101.

to phenomena such as optical illusions, which will allow us to proceed with and conclude our interpretive reconstruction of the visual process.

The first issue that is of interest here is the sensitivity of the visual system to light and various degrees of *light intensity*. Modern measurement results show that unlike what one would intuitively assume, the optic nerves are by no means inactive in the dark. They are always active, there is a "noise floor," as it were, into which the neural activities that are triggered by incoming individual light impulses will blend. This constellation, however, poses a problem to the brain, namely, how to analyze the "visible" lights since it needs to filter out, from the noise floor of neural activity, the "right" light impulses that can be associated with actual light sources.

"*The idea that discrimination is limited by noise in the nervous system has far–reaching consequences. It suggests that the old idea of a threshold intensity, above which stimuli need to be if they are to have any effect on the nervous System, is wrong. We now think of any stimulus as having an effect on the nervous System, but only being accepted as a signal of an event when the neural activity is unlikely to be merely a chance increase in the noise level. …The problem for the brain is to 'decide' when a given increase is merely noise, and when it is due to the increased intensity of the signal. …We thus reach the idea that a statistically significant difference is demanded before neural activity is accepted as representing a signal.*"[693]

This again shows that even the simple perception of light impulses, or "lights," is the result of an activity – deciding which of these light sources are to be classified as real – in terms of interpretive processes which, in turn, are nothing to do with fixed thresholds. Unsurprisingly, therefore, further reflections on this topic once more move in ways that are highly undesirable from an EAN viewpoint since they invalidate their entire theory of perception:

"*Intensity discrimination applies in this way throughout the nervous system. It applies not only to differences between intensities but also to the absolute limit of detection against darkness, because the absolute threshold is determined by the smallest signal which can be detected reliably against the random background of the neural noise, which is present in the visual brain even when no light enters the eye. Randomness – events occurring unpredictably without apparent cause – has been seized on to rescue the nervous System (or rather our view of it) from being a machine without volition or free will. But this leads us to puzzling questions: How can we be responsible for actions, whether the nervous System is precisely determined, or if it is partly random?*"

"*Randomness*" – again perception is described as anything but passive copying. There is no *mirror* of nature, *camera obscura*, etc. as thought up by EAN and materialism. Jörg Sczepek gets right to the heart of the matter:

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693 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 95f.

"*Thus, we cannot but acknowledge what seeing is: construction on the basis of necessarily limited data.*"[694]

Due to the limited nature of the "*data*," i.e. the "*poverty-of-the-stimulus*" situation, seeing is interpretive "construction," and new evidence for this is provided by perceptual physiology on an ongoing basis!

Up to this point, we have only discussed some general phenomena of perception, but once motion is involved, things get more complicated. Here, the scientific bases – that still hold true today – were established early on by the two famous German researchers Hermann von Helmholtz and Kurt Koffka. Regarding motion, the "wandering light" is a typical phenomenon, and a number of optical illusions are due to the fact that two objects of different size move relative to each other. A well-known case: we are sitting on a train and are momentarily unable to tell which train is moving: our own or the one next to it. The reason, established by the German gestalt psychologist *Karl Duncker* who studied this phenomenon in great detail, is that the mind tends to assume that it is the larger object that is stationary and the smaller object that is moving although, theoretically, it can of course be the other way round. But this is surely a situation where the first alternative has proved to be successful in the course of evolution since animals are more likely to be moving than the mountains in the background. But what about the "small" moon we sometimes see chasing across the night sky when it is actually the clouds that are moving fast? The answer, meanwhile, is not really a surprise any more:

"*It seems clear that the brain bets on small objects moving, as generally large things (trees and houses) are stationary.*"[695]

Thus, there is every indication that in the field of motion perception, too, the simple copying mode has to give way to a mode of heuristic interpretations ("*the brain bets*")! Now, due to the innate patterns that developed in the course of evolution, we are perfectly able to recognize moving humans or animals on the basis of a minimum amount of visual information, or "*input*" in Chomsky's terms. In this context, there is an elegant experiment by Gunnar Johansson that allowed him to show that human figures represented by nothing but a few light points were immediately seen as such by his test persons provided these light points were positioned so as to mark the joints:

"*Immediately the lights are seen as a human figure, and can be identified as male or female, from the slight differences of movements. …The more probable the object, the*

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694 Jörg Sczepek, Visuelle Wahrnehmung, Norderstedt 2011, p. 10.

695 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 114.

*less information is needed. This is a wonderfully powerful demonstration of the important perceptual principle that we can see more than meets the eye.*"[696]

Again, overcoming the "*poverty-of-the-stimulus*" situation – "*we can see more than meets the eye*," as Gregory so elegantly put it. Thus, motion perception, too, does away with the *mirror of nature*, the *tabula rasa*, the *camera obscura* and all the other flawed concepts!

Next, there is color perception, a particularly complex issue. It's a well-known fact that there are two types of photoreceptors in the retina, rods and cones, with rods for light/dark vision and cones for color vision, all in all about 126 million.[697] Cone photoreceptors, in turn, are differentiated into the receptors for red, blue and green, which immediately highlights the real problem, namely, how these three types of cones are supposed to enable us to construct and see all color hues. Based on his groundbreaking experiments with mixtures of lights of different colors, the English researcher *Thomas Young* was the first to show that color perception is enabled by the interaction of the receptors for the three spectral colors; and *Helmholtz* contributed to the theory accepted today, namely that by a complicated interaction of receptors and neurons, these receptors for red, blue and green indeed enable us to "see" all the colors there are. What came as a surprise, in contrast, was that brightness and color are already distinguished on the retina, and processed separately:

"*What is probably even more of a surprise is that the signals provided by the receptors are not simply transmitted to the brain such as they are.*"[698]

The more the mode of color perception was explored, the clearer it became that all the simple copy theories à la EAN had to be discarded.

"*For we tend to see the colours of surfaces of objects as much the same in spite of large changes of the colour of the light illuminating the object. This is known as colour constancy. It implies that where seeing an object is concerned, we do not see colours simply according to wavelengths of light. It also implies that displays designed to be simple for quantitative measurements in the laboratory can miss essential features of perception. A jolt was given to the more complacent, in the 1960s, by the American inventive genius Edwin Land. Apart from inventing Polaroid when still a research Student, and later developing the instant camera, he showed, with elegant demonstrations, that what is true for colour mixture of simple patches of light is not the complete story for all perception of colours. Odd things happen when the patches are more complicated, and when they represent objects.*"[699]

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696 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 116.

697 Thomas Ditzinger, Illusionen des Sehens, Heidelberg 2014, p. 9.

698 Jörg Sczepek, Visuelle Wahrnehmung, Norderstedt 2011, p. 66.

699 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 133.

If we go along with Gregory's elegant explanation, then Quine's obviously naïve explanation of color vision – "*A visual stimulation is perhaps best identified, for present purposes, with the pattern of chromatic irradiation of the eye*"[700] – again falls short, for "… *we do not see colours simply according to wavelengths of light.*"

It is not possible, nor does it make sense, to go into the entire complexity and wealth of detail of *color vision* here, that's what all the modern textbooks are for. What is much more relevant from a philosophical perspective is the overall evaluation of the process as stated by two experts. Thus, Gregory, in direct contrast to Quine's claim, argues:

"*This means that any simple account of colour vision is doomed to failure: colour depends not only on the stimulus wavelengths and intensities, but also on differences of intensity between small regions and whether the patterns represent objects.*" [701]

And Jörg Sczepek's summarizes the chapter on color vision in his succinct, but very instructive textbook by saying:

"*Leaving aside all the remaining issues, one thing has become clear: the idea that there are ready-made colors that we simply perceive is wrong. The objects do not really have them as a property, they do not exist independently of our perceptual system. Rather, our brain, relying on complicated processing operations, constructs them from the combined stimulus patterns of the three types of rod receptors in the retina that are activated by the incoming wave length patterns*."[702]

Suddenly everything we have read in Locke, Hume, Quine, Stegmüller, Carnap, Wittgenstein, Ryle, Ayer as well as many, many other EAN authors comes back to us: all the song and dance they make, striking a "scientifically sound" pose, about the "*given*," about "*matters of fact*," *simple impressions* and *ideas* that are *copied* from things, about *sense experiences* from which we read off *qualities* that we *passively imprint* on an *empty slate*, a *dark cabinet*, about *atomistic sensory impressions* that qua *sensory stimuli* present us with the *red castle*, Jones' *green necktie*, the *blue bottle* on the table, the *pink blotting paper* which, then, we imprint on the *photographic* plate while doing "*small movements of the throat and tongue*" – it's completely wrong, all of it! Just wrong.

Concerning the problem of *size constancy* and *shape constancy*, Gregory refers to the insights of *René Descartes* as formulated in his 1637 *Optics*. Unlike Locke and Hume, Descartes, as mentioned above, did not concoct some grandiose theories of perception on the basis of ostensible self-observation like a spider spinning its threads from its own body but

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700 W.V.O. Quine, Word and Object, The MIT Press 2013, p. 27.

701 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 134.

702 Jörg Sczepek, Visuelle Wahrnehmung, Norderstedt 2011, p. 86f.

relied on geometrical and mathematical calculations and studies as well as anatomical and physical experiments to formulate and prove scientific insights that are still valid today, such as, for instance, the law of refraction of light. When explaining the problem of *size constancy*, Gregory invokes René Descartes whom he holds in high esteem as an authority in the domain of vision:

"*René Descartes, perhaps the most influential of modern philosophers. It is now difficult to escape from his duality of mind and matter, which permeates almost all modern thought in psychology. He clearly described perceptual size and shape constancy, long before they were studied experimentally.*"[703]

The problem of size constancy results from the fact that while actual distances are never the same, the size of the objects we see remains more or less constant in our perception. But since this is ruled out by the geometry that defines the optical path, size constancy must be the result of a cognitive process that adapts the objects at all times to an adequate size:

"*What we call size constancy was described more than three centuries ago by René Descartes in his Dioptrics, of 1637: 'I need not, in conclusion, say anything special about the way we see the size and shape of objects; it is completely determined by the way we see the distance and position of their parts. Thus their size is judged according to our knowledge or opinion as to their distance, in conjunction with the size of the images that they impress on the back of the eye. It is not the absolute size of the images that counts. Clearly, they are a hundred times bigger (in area) when the objects are very close to us than when they are ten times farther away; but they do not make us see the objects a hundred times bigger; on the contrary, they seem almost the same size, at any rate so long as we are not deceived by (too great) a distance.'*"[704]

Based on his geometrical studies Descartes, then, concluded that the same must be true for object constancy. The issue here is that even though we see different objects whose outlines keep changing, if only because they are moving, we nevertheless perceive them with a certain degree of constancy:

"*He goes on to describe what is now called shape constancy: 'Again, our judgments of shape clearly come from our knowledge, or opinion, as to the position of the various parts of the objects and not in accordance with the pictures in the eye; for these pictures normally contain ovals and diamonds when they cause us to see circles and squares.'*"

At this point, Gregory adds a particularly enlightening remark:

"*It is odd, that this was not taken up until quite recently, very likely because it did not fit prevailing ideas of physiology and philosophy.*"

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703 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 224.

704 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 222.

It should, first, be noted that Descartes was not only the first to correctly describe the laws of size and object constancy but also clearly realized their relevance and their potential for an epistemological understanding of the process of perception. Then Gregory adds this second remark that describes the very blinding effect of the EAN dogma that I have repeatedly referred to in the above. The dogma based on the flawed assumptions made by Locke and Hume and their fellow travelers, mathematically more or less illiterate as compared to Descartes, has been so powerful that the insights gained and correctly interpreted centuries earlier by Descartes, so much more intelligent and scientifically sound, have been simply marginalized. And even today, when consulting *Wikipedia* for concepts such as object and size constancy, we find that Descartes is not mentioned at all, let alone appreciated, and, thus, once more ignored. Gregory is also one of the few scholars besides Noam Chomsky and his followers who, firstly, gives due credit to Descartes and appreciates his objective achievements and, secondly, dares to pinpoint the fundamental EAN misconceptions in no uncertain terms! Incidentally, we can once more observe the mechanism described by Cassirer, namely, that the progress of the empirical sciences takes more and more ground from under *empiricism* and exposes its arbitrary and naïve assumptions as simply wrong.

Having thus discussed some phenomena of *vision*, such as object recognition, color vision, motion, size constancy, object constancy, etc., with a focus on those aspects that are relevant for the issue under discussion, I now propose to once more return to the question of how and when vision develops in newborns and toddlers. This question is, of course, closely linked to the problem of *innate* faculties and innate knowledge, but also to the issue of what needs to be learned, and when. At first, the question is hard to answer since, obviously, we have no memory of when we started to perceive right-side-up images, and the scientific study of babies is of course fraught with a number of complex methodological and ethical problems. But over time, extremely intelligent and technically sophisticated tests and procedures have been developed that today enable us to explore and answer these questions with a high degree of certainty. A pioneer in this domain was Elizabeth Spelke and her team.

As a general rule, there are certain *innate* basic faculties that are indispensable for visual cognition, but also an essential period or time slot in the first months of life, a critical phase within which vision, that is, the decisive neurons for correct vision as well as the correct interconnections between these neurons, must be formed. If during this period vision is neglected, disrupted or even prevented (so-called visual deprivation, studied in cats and monkeys), vision is permanently and irreversibly impaired because the relevant neurons in the brain will not be formed at all, or will

atrophy. Here, stimulation by "*sense experience*" indeed plays an important role that needs to be acknowledged, the innate structures develop along stimuli! These groundbreaking discoveries were first made and described by the two Nobel laureates Hubel and Wiesel who started their experiments by stimulating the brain cells of cats.[705] All these questions may be philosophically irrelevant and not part of the questions typically asked by philosophy. But considering the decisive role the whole complex of *sense experience*, *intuition*, *sensation*, *evidence*, *perception*, *observation*, etc. etc. has played for the epistemic orientation of an entire philosophy that relied on it as its starting point, one indeed wonders at the lack of interest shown in actual scientific facts.

For vision to normally develop contact with and stimulation by the environment is needed, which is in line with the usual "strategy" of nature. In a newborn's brain, there is a certain excess of individual cells but only a small number of links to other cells, which may gradually form or dissolve depending on whether or not they are needed and/or used. Thus, the plastic nerve system has the flexibility that enables it, relying on a preinstalled basic program, to optimally adapt to the prevailing environmental conditions. This type of prudent adaptive system can be found in many domains of nature. Sensory stimuli are an important factor in this context and can, like the water that acts on the grain, stimulate or inhibit the development of the *innate structures*. But stimuli are not the defining factor that accounts for the original functional form of the structures themselves. For in principle and under normal conditions, vision develops, step by step and according to age, identically in all healthy humans.

We already know for quite some time that babies already have well-coordinated eye movements, can mimic certain movements made by their mothers, and will gaze at masks that are modeled on faces longer and more intensely than at similar, but unstructured face masks.[706] The implication is that babies are born with helpful innate elements of vision which, however, they may lose in the subsequent months. Donald D. Hoffman gives a very clear and instructive outline of the gradual development of vision in toddlers, putting it in a context that is relevant to our subject:

"*Among the most amazing facts about vision is that kids are accomplished geniuses at vision before they can walk. Before age one, they can construct a visual world in three dimensions, navigate through it quite purposefully on all fours, organize it into objects, and grasp, bite, and recognize those objects. As the psychologist Philip Kellman puts it,*

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705 See e.g. Hubel, D.H. and Wiesel, T.N. (1962). Receptive fields, binocular interaction and functional architecture of the cat's visual cortex. Journal of Physiology, 166, 106–54.

706 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 160–164. M.H. Johnson, S. Dziurawiec, J. Morton, (1991), Newborns' preferential tracking of face-like stimuli and its subsequent decline, Cognition 40, 1–19.

*the challenge facing a newborn is 'SPACE: THE FIRST FRONTIER.' By about the age of one month, kids blink if something moves toward their eyes on a collision course. By three months they use visual motion to construct boundaries of objects. By four months they use motion and stereovision to construct the 3D shapes of objects. By seven months, they also use shading, perspective, interposition (in which one object partially occludes another), and prior familiarity with objects to construct depth and shape.*"[707]

Interestingly, the development of vision in toddlers is a process that happens gradually, in age-appropriate phases and in a way that is the same in all cultures and all parts of the world, just as the way children learn to walk. On closer consideration, this strongly suggests an *innate faculty*, an innate "knowing how." It would indeed be odd if this uniform, age-appropriate development of different faculties was structured and driven by the random input of "simple ideas" à la Locke or Hume. Hoffman goes on to say:

"*Kids aren't taught how to see. Parents don't sit down with their kids and explain how to use motion and stereo to construct depth, or how to carve the visual world into objects and actions. Indeed, most parents don't know how they do this themselves. And yet it appears that each normal child comes to construct visual depth, shape, colors, objects, and actions pretty much the same way as any other normal child. Each normal child, without being taught, reinvents the visual world; and all do it much the same way. This is remarkable, because in so doing, each child overcomes the fundamental problem of vision: … The image at the eye has countless possible interpretations.*"

Here again, there is the "*inverse problem*", the fact already discussed and explained by Gregory and Palmer and established by modern vision research: the image we see and which empiricism, naturalism, realism and the like have posited as the starting point of their epistemology – the much-cited "*direct access to things*" – is actually the *final result* of a highly complex interpretive and reconstructive process. Based on the *studies* and *tests* already mentioned, Hoffman comes to the following conclusion:

"*Yet despite the richness of images, the fundamental problem of vision still holds: there are still countless visual worlds that kids could, in principle, construct from them. This makes the task sound impossible. How could a child sort through countless possible visual worlds and arrive at much the same answer as every other child?*

*It is impossible. Unless, of course, kids come to the task with innate rules by which they learn to construct visual worlds. If they are born with rules which determine the visual worlds they can learn to construct, and if these rules are universal in the sense that all normal kids have the same rules, then although these rules must blind them to many possibilities, these rules can also guide them to construct visual worlds about which they have consensus. Two toddlers, from opposite ends of the earth, can*

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[707] Donald D. Hoffman, Visual Intelligence – How We Create What We See, New York 1998, p. 12.

*both be shown the same novel image and see, in consequence, the same visual scene. We take this for granted. But it is magic unless they both share the same innate rules that guide their visual constructions. These innate rules, which grant visual mastery to the child by age one and lead to consensus in the visual constructions of all normal adults despite the infinite ambiguity of images, I call* the rules of universal vision.

*The argument here for rules of universal vision parallels a well-known argument, devised by the linguist Noam Chomsky, for rules of universal grammar that permit the acquisition and exercise of language…*"[708]

With this, we have come to another crucial point. Modern research has revealed that perception in three-dimensional Euclidean space is based on our *innate* endowment, on rules of universal vision (not unlike what Kant, as a result of logical considerations, had come to realize in terms of the *a priori* nature of the forms of intuition, i.e. space and time). We now begin to understand that if each child started out from a *tabula rasa* and, subsequently, depended on nothing but the mixed lot of stimuli or "simple ideas" and "impressions" dictated by random experience, or the "*bundle of impressions*" still favored by Wittgenstein, there would be nothing to guarantee the stability and the intersubjectively binding nature of our visual construction of the outside world. If there were no underlying *rules*, as Hoffman calls them, no *innate* biological *knowledge* that is *a priori genetically structured* and *prior to* any experience, it would be impossible for vision to develop the way it does from the infinite possibilities: gradually and methodically, and structurally identical in all humans; rather, although this development can indeed not happen unless it is triggered by the random stimuli from the outside world, it is quite independent from them with respect to its structure and regularity. The insights and the knowledge that Noam Chomsky brought to light in terms of *universal grammar* obviously also hold true for visual perception, there is indeed something like a universal *grammar of vision* as Gregory calls it, or *rules of universal vision* in Donald Hoffman's formulation.

Thus, due to the insight that the available sense data are absolutely insufficient to allow for both the acquisition of language and the step-by-step formation of vision and to explain the highly complex and infinitely various and creative achievements of language and perception, the *poverty-of-the-stimulus argument* is boosted by a kind of synergy effect. It becomes ever clearer and more distinct that man has certain *genetically provided* and *hereditary* faculties and structures, that is, *innate knowledge*, whose development, it is true, depends on the available sensory stimuli but whose structure and performance are genetically preformatted. In terms of logical reasoning Plato, who was the first to raise the issue 350 years before the Common Era, was therefore perfectly right but of course

[708] Donald D. Hoffman, Visual Intelligence – How We Create What We See, New York 1998, p. 14.

lacked the scientific foundation that would have allowed him to substantiate the idea accordingly. Now, it would be really odd – and this is where my approach comes in – if there were *innate* structures of *perception* and *innate* structures of *language* but no transitional link between these faculties, no *innate* faculty of *visual thinking*, in spite of the fact that early man, as we have repeatedly shown, managed to live without language as we know it for most of his existence. Which justifies the assumption that these structures are the basis not only for the development of the *laws of perception* such as they have been empirically studied and ascertained by gestalt theory, but also of *visual thinking* which, operating as it does without language, is therefore also *universal*, *uniformly structured* and innate, just as the evolutionarily more recent *universal grammar* that, in turn, builds on these laws.

As a result, there is a meaningful and consistent line in evolutionary development from the *laws of gestalt* and the *grammar of vision* to an *understanding of function* and *visual thinking* and, from there, to the *universal grammar* of language and the *concept of function*.

With this in mind, let's return to Richard Gregory and his – more or less similar – line of reasoning. In a chapter called "*Speculations*," he argues as follows:

"*We know about magnetism though we cannot sense it, and about atoms though they are invisible. An essential power of science is to extend knowledge far beyond sensory perception – often to change and enrich how we see. It is not hard to guess why the Intelligent Eye creates hypotheses beyond visual information; as behaviour can be directed not only to what is sensed, but also to what is hidden, and to what may happen in the immediate future. The richness of perceptual hypotheses (perceptions) confers immense survival benefits, as well as making the world and illusions perceptually and conceptually interesting. If the brain were unable to fill in gaps, and to bet on limited evidence, behaviour would come to a halt in the absence of directly relevant data from the senses.*"[709]

Gregory thus broadens the issue, proceeding from the faculty of the mind to fill the gaps in what is anyway not "given" as such to the more strategic question of where the interpretive horizon of *vision* is supposed to end. His starting point here is optical illusions, famous for being a longstanding object of studies and literature. The most popular ones that are discussed in great detail in the relevant textbooks are: the rainbow, the Necker cube, the Müller-Lyer illusion, the Mackay effect, the Ames room illusion, the rabbit-duck illusion[710] (see also Wittgenstein's discussion of

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[709] Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 245f.

[710] Although the rabbit-duck illusion is also based on the principle of non-uniqueness and triggers a permanent flipping between the duck and the rabbit perception, the underlying mechanism is different from that of Rubin's famous

it), the geometrical-optical illusions of Hering, Poggendorf, Orbison and Zöllner, the Ponzo illusion, typically seen with rails, the Kanisza triangle, and many more illusions with various shadows, grey color fields that are actually white, etc. The interesting point about all these illusions is that they also work when we have realized the underlying mechanism and have seen through their actual nature. Still, they never fail to work, the given fact will deceive us even though we have realized our error or verified the measurements.

"*Ambiguities* (such as the rabbit-duck, my note) *can be extremely useful for perceptual research: as perceptions change though the input to the eyes remains unchanged — so we can see what is going on 'from the inside'. So 'flipping' visual ambiguities allow us to separate effects of bottom-up signals from the eyes from top-down knowledge and assumptions. … The more top-down contribution, the less 'direct' is perception. This is bad news for the empiricists seeking certainty for seeing, but good news for those who think of perception as intelligently creative – making effective use of the limited available data to represent what might be out there.*"[711]

A deeper understanding of optical illusions provides us with yet another instructive example of how mistaken the empiricist theory of perception also is in this domain. Tiresome as it may be, this still needs emphasizing because the dogma is so deeply ingrained. Even Gregory more or less says so, notwithstanding his self-definition as an empiricist in the sense of the Anglo-American understanding of science: "*This is bad news for the empiricists seeking certainty for seeing …*"

Gregory now takes a very creative and remarkable step forward. He identifies the *four* basic patterns of *optical illusions* and correlates them with the *four* types of *errors of language*!

| | |
|---|---|
| a) Ambiguity: rabbit-duck | "People like us" |
| b) Distortion: Müller-Lyer illusion | "He's miles taller than John" |
| c) Paradox: Impossible object | "She's a dark haired blonde" |
| d) Fiction: Kanisza triangle | "They live in a mirror" |

"*The appearances fall neatly into four classes, which we have called ambiguities, distortions, paradoxes, fictions. It may be noted that these are also errors of language. This may be no accident. Perhaps human language developed from pre-human percep-*

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vase with the two faces. For, there, the reversal between foreground and background operates at a lower, automatic level. In the rabbit-duck drawing, there is no contrast between background and foreground, nor in the drawing itself. Rather, it is obviously a reversal already at the level of automatic object recognition. Ken Nakayama, Zijiang He, Shinsuke Shimojo, Visual Surface Representation: A Critical Link between Lower-level and Higher-level Vision, in: Stephen Kosslyn, Daniel Osherson (Eds.), Visual Cognition, Vol. 2, Bradford Book MIT 1995, p. 9.

711 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 206.

*tual classification of objects and actions. This notion might explain why the natural languages have similar basic structures. This is stressed by experts such as Noam Chomsky and Steven Pinker, though such innateness is perhaps controversial. (…) We have hinted that perhaps the essential structure of languages derived from ancient, pre-human, perceptual classification of objects and actions. For it is striking that the obvious names for kinds of illusions are the same as for errors of language: ambiguities, distortions, paradoxes, fictions."*[712]

Lo and behold, the four basic error patterns are the same in both vision and language! This is a real step forward that substantiates the strategic idea of the *visual turn* because Gregory proposes a kind of *universal grammar of vision* along the lines of Noam Chomsky's *universal grammar* and repeatedly suggests that the grammar of language may have evolved from the rules of vision, an argument Gregory had already put forward in the context of his discussion of the classification of illusions:

"*We will call them ambiguities, distortions, paradoxes and fictions. It may be no accident that these correspond both to errors of language and to errors of perception. Both perception and language give descriptions, and both depend upon how objects and situations are classified for behaviour. It may indeed be that very ancient, pre-human, perceptual classifications are the basis of the structure of languages. Perhaps language developed so fast in humans because it built upon the perceptual experience of many millions of years of classifying objects and actions, giving nouns and verbs.*"[713]

The latter argument thus sets forth yet another innovative idea since the relatively rapid appearance of language in the course of human evolution has to the present day remained a mystery that even Chomsky and Pinker find remarkable.

Since in the course of evolution, vision clearly developed before language, and since similar ambiguities and illusions as well as processes and rules are found in both domains – since there is an "*affinity*" (Kant) between both faculties, as it were –, it logically follows that development can only have proceeded from vision to language and not the other way round. The moment this congruence is established, a logical sequence emerges from vision to thinking – if only in terms of what I have baptized the *understanding of function* – and from *visual thinking* to linguistic thinking; which, given the course of evolution and the huge temporal gap, cannot be otherwise. Thus, the first step of this development is the *grammar of vision* with at its core the laws of *gestalt theory*. Development, then, proceeds from the topographical organization of vision, as convincingly demonstrated by Kosslyn, to *imagination* – that is, in Kantian terms, the

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712 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 247f.

713 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 204.

*power of imagination* – to general imagination (as I will later show in more detail) and to an understanding of the *function* of a thing, for instance finding the solution to a problem by rotating an object in the imagination – the first true form of thinking. This *visual thinking* should, then, be conceived of as the point of departure for the development of language that, in turn, can be expected to have similar structures since it has in all likelihood grown out of this visual milieu. The development, therefore, is from a "speechless" *understanding of function* to the *concept of function*.

To conclude and complete this introductory chapter on vision, let me discuss another important point that came to be expressed in the discovery and way of seeing of *perspective*. For up to now, we have discussed interpretive patterns of vision that are obviously innate and are used unconsciously. Experiencing an optical illusion is something that happens "automatically," with the observer unable to explain why two straight lines appear to be bent or why one of two arrows of exactly the same length appears to be significantly longer than the other. Now, central perspective presents us with the interesting case that although perspective view has been repeatedly used even as far back as in cave paintings some 30,000 years ago, and although we obviously have this cognitive faculty since we do see things in perspective, the awareness and understanding of this visual geometry is a relatively recent achievement that only became a permanent companion of and fascination for humanity as late as in the Italian Renaissance. Another case in point is reported by Wolfgang Metzger, namely, the tendency to overestimate the height of mountains. In most ancient paintings, the mountains are much higher, in relation to the persons shown, than they really are. This is due to a systematic illusion in the way they are perceived. It is only in the last one or two hundred years that mountains in paintings tend to appear in their true proportions. Depth, too, is typically overestimated, as recent studies have shown, most dramatically so (by up to 84% of the real depth!) when perceived from the top.[714] Both these phenomena are probably due to evolutionarily developed innate mechanisms that prompt the observer to overestimate the risk, which would make sense. At any rate, regarding our understanding of perception, the interesting thing about perspective is that it is an example of a learning process that goes beyond innate mechanisms. In this case, we can indeed speak of an influence, or learning effect, of experience. Thus, Richard Gregory observes:

[714] Jackson R.E. & Cormack L. K, Evolved navigation theory and the descent illusion; Perception & Psychophysics 2007, 69 (3), 353–362.

"*It is an extraordinary fact that simple geometrical perspective took so long to develop – far longer than fire or the wheel – yet in a way it has always been present for the seeing, as the images in our eyes are perspective projections.*"[715]

In a way, the problem of perspective seems at first to be a simple geometrical one. Brunelleschi is supposed to be the "inventor" of perspective, and Leonardo already described it as the "bridle and rudder of painting." Gregory quotes Leonardo:

"'*Perspective is nothing else than the seeing of a plane behind a sheet of glass, smooth and quite transparent, on the surface of which all the things approach the point of the eye in pyramids, and these pyramids are intersected on the glass plane.' Leonardo treated the perspective of drawings as a branch of geometry. He described how perspective could be drawn directly on a sheet of glass, a technique used by the Dutch masters and, in a later form, with the camera obscura which employs a lens to form an image of the scene which may be traced directly.*" (loc. cit., p. 176)

This is interesting insofar as we know the expression "*camera obscura*" from John Locke who uses it as a metaphor for the role of the mind in perception. Now we once again need to ask whether in the case of perspective, the metaphor makes sense and is correct or whether perspective, too, is a much more complex phenomenon than what "self-observation" led him to assume. And any reader who has followed my reasoning up to this point will already suspect that even this apparently simple analogy will turn out to be simply wrong, just like any other empiricist assumption and claim:

"*…but as Leonardo realized more clearly than many later writers, there is more to the matter than pure geometry. Leonardo includes in his account of perspective such effects as increasing haze and blueness with increasing distance and the importance of shadows and shading in drawings to represent the orientation of objects. These considerations go beyond geometry. ... Let's look at what is going on, in as simple a way as possible. Consider a simple ellipse (…). This might represent an elliptical object seen normally or a circular object seen obliquely. This figure does not uniquely indicate any one kind of object; it could be a projection of any of an infinite variety of objects, each seen from a certain angle of view. The art of the draughtsman and painter is in large part to make us accept just one out of the infinite set of possible interpretations of a figure: to make us see a certain shape from a certain point of view. This is where geometry goes out and perception comes in. To limit the ambiguity of perspective, artists must make use of perceptual cues available to a single eye. They are forbidden the binocular distance cues of convergence and disparity, and also motion parallax. Indeed, these cues will work against them. Paintings are generally more compelling for depth when viewed with a single eye with the head kept still — because motion and the second eye show that the picture is flat. We have to consider a double reality.*" (loc. cit., p. 177)

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[715] Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 175f.

Again, Gregory shows that what we have here is actually a "*double reality*" and "*ambiguity*" that results in "*the infinite set of possible interpretations of a figure*." Even the perspective view, apparently easy to explain in geometrical terms, is the result of the highly intelligent artistic skills of the painter who uses various technical tricks and prompts to steer the unsuspecting viewer towards *this specific* interpretation among the infinite number of possibilities. And it is in precisely this sense that Locke's metaphor of the *camera obscura* falls short again, just as his entire empiricist lore of the process of perception does. So it would seem in order to once more return to the main EAN theory of perception at this point and to paradigmatically show how this totally wrong doctrine leads to a completely mistaken overall EAN theory of knowledge. Let's start with a quotation from Alvin Goldman's "A Causal Theory of Knowing":

"*Perhaps the simplest case of a causal chain connecting some fact p with someone's belief of p is that of perception. I wish to espouse a version of the causal theory of perception, in essence that defended by H.P. Grice. Suppose that S sees that there is a vase in front of him. How is this to be analyzed?*"[716]

Seeking to explain his causal theory of knowing, Goldman chooses what he believes to be "*the simplest case*" and justifies his choice by referring to H.P. Grice's "*Theory of Causal Perception.*" After all the clarification offered in this chapter, it really verges on the grotesque to see famous philosophers assume perception to be the "*simplest case*." Another noticeable point is Goldman's choice of the vase, that is, an object the viewer already *knows* and where the process of constructive interpretation as we have come to understand it due to vision science has already happened. The EAN *mechanism of self-deception* in action! This self-deception enables Goldman to conceive of vision as a "simple" causal process although, as we have by now sufficiently demonstrated, it is an interpretive, probabilistic, constructive one! Goldman then pursues his argument by presenting a ridiculous theoretical example:

"*I shall not attempt to describe this causal process in detail. Indeed, to a large extent, a description of this process must be regarded as a problem for the special sciences, not for philosophy. But a certain causal process — viz, that which standardly takes place when we say that so-and-so sees such-and-such — must occur. That our ordinary concept of sight (i.e., knowledge acquired by sight) includes a causal requirement is shown by the fact that if the relevant causal process is absent we would withhold the assertion that so-and-so saw such-and-such.*" (loc. cit.)

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[716] Alvin I. Goldman, A Causal Theory of Knowing, Journal of Philosophy, Vol. 64, No. 12, (1967) p. 358.

That there must be a "*causal requirement*" of some sort is evident but, as we have also shown, even the representation of a very simple object involves multiple interpretive patterns while the relation in question is highly complex and by no means as linear, analogous and simple – "*that so-and-so saw such- and-such*" or "*S sees that there is a vase in front of him*" – as Goldman suggests. Of course, there is a certain causal dependence between the object and its perception, it's unlikely for the vase to be perceived as a donkey, but here again the EAN *self-deception mechanism* is at work because the vase is something we already know. It is fortunate for Goldman that he did not choose bone marrow as an example, since in that case S would have recognized – nothing. That's all there is to say about *the simplest case* as a cornerstone of the epistemology of EAN.

**Conclusion:**

1. "Seeing" is made up of two anatomical-physical-physiological components, one that generates the stimulus pattern on the retina, a two-dimensional, right-left-inversed and upside-down "image," and another one, larger by far, that is in charge of the cognitive interpretation, i.e. the build-up of the "visual image" in multiple reconstructive dimensions and steps, that permanently takes up about half of our overall brain capacity.
2. All the essential and defining elements of the encoded visual image, i.e. distance, three-dimensionality, colors and color hues, contours, lights and darks, textures, object constancy, size constancy, perspective, motion, are continuously processed and reconstructed, interpretively, in a highly complex work of interconnections and cannot be *directly* and *analogously* – copy-like – reduced to what is "given."
3. The harmonious interplay of all these elements is what allows for the formation of the field of vision and the elements, textures and objects it contains. This generation of the visual image is partly probabilistic and partly heuristic, it is an interpretive reconstruction of sensory impressions. Contents such as figures, whole objects, groups of objects, movements, colors, contrasts are formed in accordance with the laws of gestalt, and may or may not follow something like Bayesian statistics. Still, I believe that what came into being in animals and humans in the course of evolution is not a statistics program such as "Google," for instance, that needs to collect millions of klicks over a long period but, rather, a very fast perceptive faculty in the style of the laws of gestalt.
4. In the field of view, certain optimized "good" or "simple" forms stand out – show a certain pregnance – that serve as the basis on which individual elements in the field of view are framed, combined

and "seen together," according to the innate gestalt laws already described, as whole entities that may or may not move ("law of common fate"). These gestalt laws coincide with the figures of Euclidean geometry (circle, triangle, square) and "good forms" that are preferred over "bad forms" and seem to be also part of our innate endowment. Human perception operates as a temporal process in a three-dimensional space and seems not to be built according to the principles of non-Euclidean geometry; which also means that Kant was not so wrong in this respect.

5. Gestalt laws provide a first basic organization of our perception, a form of order, from which – some speculation seems justified here – an understanding of function and, then, visual thinking can be assumed to have gradually developed. What Descartes described as *intuitive evidence* is partly – insofar as it applies to the visual domain – visual thinking. Gestalt laws help us to recognize the perfect form of the circle, but our first understanding, through seeing, of center, diameter, angles, tangents is due to visual thinking based on a previously developed organization in terms of gestalt laws and on an understanding of function.
6. By extrapolation, speculative, it is true, but also logical, gestalt laws can also be assumed to have provided the basis for the development of a universal grammar of vision and, from there, visual thinking and later a universal grammar of language.
7. The laws and mechanisms of vision science are diametrically opposed, in virtually every domain, to the EAN doctrine that is based on Locke's and Hume's one-man-observations, claims and inventions. There is no "given", no atoms of perception, no *simple ideas* and no *complex ideas* assembled from them, no passive reception of *impressions*, no visual images consisting of nothing but retinal stimulations and stimulus patterns (Quine), no "bundle of impressions" (Wittgenstein). Visual images are not copies of the outside world, there is no copying in the Humean sense, no "photographic plates" as proposed by Russell, no analogous reproduction as conceived of by Wittgenstein in the Tractatus. The image of reality we see is not the starting point but the *endpoint* of a continuous, comprehensive and complex interpretive process that does not preclude illusions and visual ambiguities. Like the patterns of thinking, these basic patterns are innate and, based on something like a grammar of vision, help the mind to create a readable image from the rhapsody of incoming waves and photons. Only when this visual image has been created – as the result of what, in a wider sense, could be described as a "*figurative synthesis*" – can thinking, in a further process of conceptual-categorial rule-based synthesis as set forth by Kant, begin to conceptually analyze

the forms created. This means that even at this level of perception, we can never perceive reality directly, such as it is in itself in terms of intuition, we can always only interpretively shape and perceive it in our mind; which, however, is not a random process but one that follows the innate gestalt law patterns and the innate rules of the grammar of vision.

8. The entire doctrine of perception held by empiricism and all of EAN – and this, too, has become apparent in this chapter – is completely beside the point as an epistemological project and in contradiction to the insights of modern vision science, whereas the concept proposed by rationalism and Neo-Kantianism is largely consistent with modern state-of-the-art scientific knowledge.

## 4. The scientific evidence for innate knowledge, and the fall of the second empiricist dogma

Having thus taken stock of the current state of our knowledge about *vision*, let's now address the second major issue in the centuries-long confrontation of *rationalism* and *empiricism* from an up-to-date point of view. *Nativism*, that is, the view that there are uniform, *dispositionally innate* cognitive functions, structures, faculties as well as pre-formatted, innate knowledge, and that the latter gradually develops in ontogenesis in response to external and internal stimuli is a philosophical current *per se* as well as a strategic element of *rationalism*. However, nativism in rationalism is not an end unto itself nor an arbitrarily adopted tenet but the logical consequence of "Plato's problem," that is, the realization that for insight to happen at all we need to bring to it certain forms, gestalts, ideas, unities etc. of our own because these, as has been abundantly argued in the above, are not included in the chaos of sensory impressions. *Rationalism's* commitment to *nativism* is, therefore, *not* primarily due to mythical, religious or sociopolitical motives but is seen as a necessary as well as logical element which, what is more, is increasingly corroborated by the sciences and will, therefore, ensure that in the epical confrontation with EAN beliefs *rationalism* will prevail in this domain just as it did in the domain of vision.

It is in this sense that I will now take a closer look at the concept of "*innate*" and at the debate about what it is supposed to mean. For if "innateness" is something to do with heredity, and if heredity is currently associated with *genetic* processes, it obviously follows that it plays a role not only in the evolutionary history of man but also in psychology, philosophy, anthropology and many other fields. And whenever a concept is made to cover so many complex phenomena and relations in so many sciences, lack of clarity and misuse are bound to appear, which of course

should be avoided. So, since this is such a many-faceted and convoluted issue, I will in the following discuss it from a variety of angles in order to give a best possible account of the overall problem without losing sight of its core.

One of the most prominent critics of the concept "innate" is Paul Griffiths who argued that *innate* was "*a confused concept*," that is, unclear or ill-defined, and actually a mix of three different concepts: *developmental fixity*, *species nature* and *intended outcome*.[717] He also cautions against the indiscriminate use of the concept to explain the most diverse phenomena, and against the tendency to discount the environmental factors that from the very beginning interrelate with the innate structures. Considering that until a few decades ago, philosophy and psychology used to discard "*innate knowledge*" as a completely ridiculous tenet from the "attic of the 17th century," it is quite remarkable that the current debate is by now primarily concerned with showing that not *all* capacities and *all* kinds of knowledge are *dispositionally* innate and that environmental factors need to be taken into account, as well. A formerly alluring EAN position has turned into a permanent rearguard action beyond hope of rescue. In a very compelling study, Richard Samuels has responded to criticism that "innate" is a confused concept, his general argument being that just because "*innate*" may indeed cover a number of meanings and, thus, be ambiguous in common usage this does not mean that the concept *per se* is confused. He then describes three types of usage:

"*(a) If lexicographers are to be believed, 'innate' is used in nonscientific contexts in many ways (e.g., to pick out traits that are present at birth, that are inherited, and that are in some sense intrinsic).*
*(b) Different scientific enterprises use the term differently. For example, in genetics 'innate' sometimes means genetically encoded (whatever precisely, that means), while in immunology it is often used to denote those parts of the immune System that do not arise from previous infection or vaccination.*
*(c) Even within cognitive science, it is clear that different theorists have tried to stipulate meanings for the word 'innate', and that these various stipulations differ in both extension and intension (Elman et al, 1996).*"[718]

It is true, of course, that any in-depth examination of the meaning per se of *innateness* in the respective fields – like the one done above, arguably for the first time ever, for the concept of "*experience*" – would also bring to light some lack of clarity. Also, one cannot help feeling that the classical debate between rationalism and empiricism about *tabula rasa* and *in-*

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717 Paul E. Griffiths, What Is Innateness? The Monist, Vol. 85, No. 1, The Philosophy of Biology (January 2002), pp. 70–85.

718 Richard Samuels, Is innateness a confused concept? In: Peter Carruthers, Stephen Laurence, Stephen Stich (Eds.), The innate Mind, Oxford University Press, Oxford/New York, Vol. 3, 2007, p. 20f.

*nate ideas* has rather turned into a debate about the respective importance of what is innate and what is acquired or, in biological terms, the importance of genetic information as compared to environmental input for the capacities or traits of living beings. A closer look at Descartes' attempt, for instance, to illustrate the innateness of certain capacities by likening it to the way a congenital familial disease is hereditary would certainly bring to light some indistinctness of meaning. For a congenital disease can manifest itself already at birth or only much later, it can show few symptoms and, thus, be barely noticeable, or progress to the highest level of severity. Being inscribed into the various tissues, its symptoms are genetically determined, yet the actual course of the disease depends on the individual concerned and his or her constitution and living conditions; and, most important of all, it is a familial disease and as such precisely not *universal*, contrary to what we'd expect the innate faculty of reason to be. And, as already discussed above, what about a pathological metabolic product that is associated with the congenital disease? If we were obsessively pedantic, we could say that it was not present at birth but is a later *consequence* of the congenital disease. But no one in his right mind will fail to understand and acknowledge that the pathological metabolic product is, after all, precisely this: the inevitable consequence of the congenital disease, something that results with necessity from the congenital physiological malfunction rather than something acquired such as, for instance, lung damage from smoking.

In contrast, when *rationalism* seeks to show that the basic structures of the understanding and reason are *innate*, in the way this has been shown for *universal grammar* (aside from the fact that Chomsky's doctrine of the innate universality of grammar is today largely accepted in linguistics and philosophy, there is a recent scientific study that seems to confirm his doctrine also from the perspective of neurocognition),[719] then this implies the assumption that under normal conditions these structures are uniformly developed in all humans, are potentially structured in the same way, are functionally activated at a certain age in the normal maturing process and are sufficient, at least as regards their general performance, to enable humans to orient themselves on the earth and in society. This normal activation of *innate structures* is what Steven Stich has described as "*the normal course of events.*"[720] This, however, would once more afford an opportunity for the skeptic to make short shrift of innate traits and their normal development by inventing the most diverse environmen-

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719 David Poeppel, Nai Ding et al., Cortical tracking of hierarchical linguistic structures in connected speech, Nature Neuroscience, Vol. 19, No 1, January 2016, p. 158–67.

720 Stephen P. Stich (Ed.), Innate Ideas, Introduction, University of California Press, Berkeley and Los Angeles 1975, p. 10.

tal conditions. In the chapter on *vision*, we have already described how experimental animals – as shown in Hubel and Wiesel's cat experiment – fail to develop "normal" vision when they are blindfolded during the first post-natal months because the respective neurons in the brain cannot form and vision cannot be learned any more after this critical phase. In terms of logic, does this mean that the capacity of normal vision is not innate but depends on the environment? No, it only means that if the normal course of events is artificially suppressed, the result is some damage that thwarts normal development. Also, and this is crucial, the innate dispositions for vision will always, regardless of the sensory input that comes streaming in from the environment, develop into a uniformly *structured*, efficient *capacity of vision* but never into a capacity of, say, smelling. This means that sensory input indeed "triggers" the potential of innate dispositions but can never suffice to build and structure vision, or thinking, in a way that is uniform in all humans. Just think of Donald D. Hoffman's very logical argumentation, i.e. that it is possible for all children worldwide to learn vision although environmental influences and parents always differ and the world of sense experiences needs to be permanently reinterpreted:

"*How could a child sort through countless possible visual worlds and arrive at much the same answer as every other child?*

*It is impossible. Unless, of course, kids come to the task with innate rules by which they learn to construct visual worlds. If they ate born with rules which determinate the visual worlds they can learn to construct, and if these rules are universal in the sense that all normal kids have the same rules, then although these rules must blind them to many possibilities, these rules can also guide them to construct visual worlds about which they have consensus. Two toddlers, from opposite ends of the earth, can both be shown the same novel image and see, in consequence, the same visual scene. We take this for granted. But it is magic unless they both share the same innate rules that guide their visual constructions. These innate rules, which grant visual mastery to the child by age one and lead to consensus in the visual constructions of all normal adults despite the infinite ambiguity of images, I call the rules of universal vision.*

*The argument here for rules of universal vision parallels a well-known argument, devised by the linguist Noam Chomsky, for rules of universal grammar that permit the acquisition and exercise of language…*"[721]

Also, we should once more call to mind Noam Chomsky's "poverty-of-the-stimulus" argument, that is, the fact that even children with speech-impaired parents, or children who are otherwise linguistically deprived, follow the grammar of a language. This means that the innate faculties will assert themselves according to their structure even under unfavorable or outright adverse conditions and that, therefore, the disposition is obvi-

[721] Donald D. Hoffman, Visual Intelligence – How We Create What We See, New York 1998, p. 14.

ously stronger and more essential than the environmental conditions. Interestingly, concerning the latter, all those skeptics who tend to be meticulous to the point of hairsplitting when it comes to questioning the concept of innateness seem to have no qualms whatsoever about the concept "*environmental conditions.*" It is almost as if the concept of "*environment*" had by now been charged with the role that "*experience*" used to play for the empiricists – a washed-out remedy for every flaw that might stand in the way of their calling into question the innateness of faculties and knowledge. Unlike dispositionally innate functions that are relatively homogeneous and, thus, relatively easy to define, "*environmental conditions*" is probably one of the most vague and fuzzy concepts imaginable. But what is really important in this context, much more so than engaging in a hairsplitting vivisection of what "*innate*" might mean, is to ask the strategic question of *how* knowledge and insights can be gained if there are innate structures and functions (which would, then, of course need to be defined and explored in ever more detail) and *how*, in contrast, this is supposed to happen if there is nothing but *tabula rasa* and *sense experiences*.

Plato was the first to conclude, as a result of logical reasoning, that the innateness of "ideas" should be considered a philosophically indispensable element of cognition. In the modern era, it was primarily *René Descartes* and *Gottfried Wilhelm Leibniz* (apart from Ralph Cudworth and Herbert of Cherbury) who insisted that *innate knowledge*, or the dispositions to generate it, was an important and indispensable element of any understanding, while the current renaissance of nativism is arguably due to *Noam Chomsky* as well as to advances in the biosciences. Harry M. Bracken succinctly summarizes the two main reasons for this "comeback" of innate ideas within a free, spontaneous mind in the modern debate:

"*Man has a species-specific capacity, a unique type of intellectual organization which cannot be attributed to peripheral organs or related to general intelligence and which manifests itself in what we may refer to as the 'creative aspect' of ordinary language use – its property of being both unbounded in scope and stimulus-free. Thus Descartes maintains that language is available for the free expression of thought or for appropriate response in any new context and is undetermined by any fixed association of utterances to external stimuli or physiological states (identifiable in any noncircular fashion).*

*Chomsky holds that it is the 'appropriateness' of our responses, as Descartes put it, that is beyond the limits of 'mechanical explanation.'*"[722]

Bracken, too, clearly identifies Noam Chomsky as the "icebreaker" who, building on Descartes' ideas and based on his own linguistic studies and investigations, initiated this turn:

[722] Harry M. Bracken, Descartes, Oxford 2002, p. 20f.

"*There are two factors which have driven the return to innate ideas. First is what is called 'the argument from the poverty of the stimulus'. As children we very quickly develop a rich facility with language on the basis of extremely limited data. Children learn to do such things with language as how to form questions, how to form passives, etc., without any 'teaching.' Moreover, children are able to understand sentences which they have never heard before. Indeed, most of what they say and what they hear has not been said before. Conclusion: our language skills are not a product of input from the world via induction and repetition. Our mind/brain is pre-structured to process the language we hear and see.*" (loc. cit.)

Thus, the discovery of universal grammar is clearly highlighted as the turning point towards nativism. But there is another field that has traditionally, and already for Plato and Descartes, served as a starting point for their discovery of innate knowledge – the field of mathematics and geometry which by their very nature as an open and demonstrative mode have contributed a new dimension to the purely philosophical debate:

"*Mathematics is another area in which the appeal to the 'poverty of the stimulus' also holds. Like language, our rich knowledge of mathematics reaches far beyond such data as we may encounter. In fact, it is hard to imagine why people of an empiricist persuasion ever thought (and some still think) that on the basis of a blank tablet, we could peel off, so to speak, words and numbers from the world we encounter. Second, there is the creative activity with language which Descartes, as noted, took to be a uniquely human capacity. Neither can be handled within a purely empiricist framework.*" (loc. cit., p. 21)

It is this very special creative capacity of man that allows to not just follow the rules like an automaton or be guided by behaviorist drill ("Abrichtung," Wittgenstein) and inculcation or "training on the part of society" (Quine) but to spontaneously produce answers that are always different and unexpected, or simply behave in ways that differ from what one would expect if behavior was hardwired. It is an essential trait of a free and creative human being that was discovered and emphasized by Descartes and marks the essential difference between the mind and the biological-physical body. Much to the chagrin of EAN, the mind is neither a pocket calculator nor a "calculating device" (Lorenz) nor a machine (Churchland) and, fortunately, still not completely manipulable.

Now, before going into the details of the vast and complex discussion about innateness, let's briefly consider why the controversy between *rationalism* and *empiricism* has always been at its most heated when innate ideas were at stake. What is so terrifying, so awful, about the assumption that there are innate faculties and, as a consequence, innate knowledge that *dispositionally* "pre-forms" our thinking that it needs to be warded off at all costs? Nobody would deny or consider problematic or outrageous the suggestion that all bodily processes – digestion, circulation, reflex movements, hormone release or the functions of the brain stem that regu-

late vital functions of the body – are functionally *innate*. Nobody would pretend that the release of the thyroid hormones needed to be learned by "experience" and engage in a lengthy debate about it. So what is the big deal when it comes to the architecture of the neural functions?

Obviously, underlying the scholarly debate, there is an ideological conflict, and since between age ten and age eighteen, I was myself strongly influenced by materialist ideas I can even understand it. In the 1970s, when I was that age, the prevailing tenet was that human beings could be fundamentally formed, educated and "refined" regardless of heredity. It was assumed that once society was transformed and ideally structured, parents would raise their children in an optimal way, and once there were enough schools, universities, educational openings etc., most of humanity could be gradually improved and a good and just society could be established. Moreover, due to the cautionary example of 20th-century racist and fascist ideologies, any reference to inherited traits, genetics in general and even scientific genetics was felt to be more or less taboo, suspect, repulsive. Therefore, from a present-day perspective, it is of primary importance to be absolutely unbiased and level-headed in our perception of the actual situation and the scientific facts so as not to let ourselves be carried away by obsolete ideologies, jumping to questionable conclusions or taking sides with scientifically untenable currents.

In his portrait of Noam Chomsky, Günther Grewendorf addresses the problem of the possible sociopolitical implications of the different positions on "innate knowledge." He quotes a passage from Noam Chomsky's "For Reasons of State" where the latter points out that certain political systems are only too likely to wish for particularly malleable beings not endowed with an innate, spontaneous, creative and, thus, non-predictable mind:

"*Chomsky points out that although such a view has often been associated with progressive and even revolutionary sociopolitical ideas, the concept of a human nature that is malleable at will and does not yet have a structure of its own may also serve to justify the most reactionary social structures:*

> *'If in fact man is an indefinitely malleable, completely plastic being, with no innate structures of mind and no intrinsic need of a cultural or social character, then he is a fit subject for the "shaping of behavior" by the state authority, the corporate manager, the technocrat, or the central committee.' (N. Chomsky in 'For Reasons of State', New York 1970)*

*Thus, the empiricist view that in its psychological aspects, human nature is nothing but a product of history and given social conditions provides the powers that be with every excuse for their use of force and comprehensive indoctrination and manipulation. For Chomsky, this legitimation potential is the reason why this empiricist view has had such a strong appeal for intellectual ideologists of whatever political orientation*."[723]

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[723] Günther Grewendorf, Noam Chomsky, München 2006, p. 184.

Thus, the objection is formulated in no uncertain terms. What Chomsky's argumentation comes down to, in a nutshell and without actually overstating it, is that if all knowledge arose from sense experience as posited in empiricism and if therefore – to return to the computer comparison – all there was in the brain was empty hard disks devoid of self-conscious, unpredictable, creative, spontaneous, individual programs, then any malevolent manipulator would be free to install her programs on these empty hard disks at will. And since in empiricism, all knowledge is supposed to stem from experience, this encoding would also be successful. This may be the reason why Chomsky chose Descartes as his philosophical guiding figure because the latter was an unconditionally individualistic intellectual who consistently went his own way and, in so doing, came upon an entity – the *creative*, *free* and *self-conscious mind* of the *res cogitans* – that was to become the figure on which the *free individual of modernity* was modeled. For Chomsky, this aspect of innate knowledge is what guarantees the creativity and freedom of man, while the basis of this innate knowledge, in turn, is the innate faculty of the *universal grammar* of language.

Now, Grewendorf quite rightly points out that the insistence on innate capacities and traits has also been used as an argument by the most evil political regimes and, therefore, cannot per se and automatically guarantee the safety of a free society. I agree with his analysis in this point, so what I propose to do is to stick to, and treat accordingly, what is scientific fact and makes sense in terms of logic and reasoning and, disregarding all one-dimensional, ideological or political motives, arrange these facts into a logical chain, a system that is in line with the logic of evolutionary biology, on the one hand, and the nature of our self-conscious and creative mind, on the other. It is beyond doubt that the rapid rise and growing knowledge of modern molecular biology and genetics has simply brought to light certain insights and established certain facts that reveal the original empiricist doctrine that *all* knowledge stems from sense experience *alone* as simply absurd.

All in all, it is remarkable that Noam Chomsky starts out from a definite commitment to the *natural sciences* and the *theory of evolution* but at the same time firmly sides with the *rationalist tradition* from *Plato* to *Descartes* and, if somewhat less pronounced, Kant. Now, in the debate between empiricism and rationalism, the confrontation I have described has obviously not been triggered by purely philosophical considerations and ideas alone. Descartes, the founder of modern philosophy, had made a radical break with the *Aristotelian* discourse of the Middle Ages and built his philosophy, fundamentally and comprehensively, on the insights and models of thinking set forth by *Plato*. Clear evidence for this can be found in various passages of his writings as well as in certain observations made in his letters and in his defense against Voetius. Even Leibniz paid

tribute to Descartes for this renewal. His philosophical thinking also shows certain similarities and resonances with the "Cambridge Platonists," for instance Ralph Cudworth, who is also frequently quoted by Chomsky.

At the same time Descartes, as mentioned, was religious (just as Cudworth was) and anxious to avoid conflicts with the Catholic Church. But his writings – and this is important to emphasize – can be regarded as absolutely secular, or scientific, and can be read as such by anyone who wants to do so. Obviously, he speaks of the *natural* light and not the *divine* light when he talks about reason! And yet it can't be denied that he also employed his characteristic sharp-wittedness to provide evidence for the innateness of the idea of God. Also, the self-conscious and creative mind is always within a hair's breadth from being a soul in the Christian sense, that is, isolated from the body. And this may well be what touched a sore spot in Locke, Hume and the bourgeois empiricists in general, even though, as shown, God as a guarantor plays a role in Locke, too. Especially in Hume, however, many arguments read as if they were produced and positioned as part of an immunization strategy, as it were, against any form of religious interpretation. Once and for all, the argumentative ground was to be systematically cut from under any assumption of an innate idea of God, any belief in angels and miracles, any hagiography, as well as any idea of a soul that was completely isolated from the body and, then, free to ascend up into heaven. Inasmuch as the empiricists' more or less hidden intention here was to ensure the independence of their scientific research, this strategy certainly made sense. But by identifying the free and creative mind of man with a "ghost in the machine" (G. Ryle) and discarding everything that was not directly observable, i.e. our own thinking, as metaphysics that needed to be eradicated, they just threw the baby out with the bathwater.

To proceed with my argumentation, I now propose to follow *Peter Carruthers'* reasoning in his intriguing book "*Human Knowledge and Human Nature*," for if a declared empiricist argumentatively and point by point explains why the arguments against *nativism* are unsound but keeps providing evidence that *innate knowledge* and *innate concepts* indeed exist, then it's surely wise to follow him! That he preferred to suffer shipwreck with the sinking vessel of empiricism even in the face of the huge amount of more recent findings is clearly documented by the concluding sentence of his book:

"*In the end, an empiricist is what everyone should be.*"

At first, however, even Carruthers wonders why Locke and Hume, the two spearheads of empiricism whom he explicitly refers to in his book, were so radically opposed to nativism. He, too, suggests that the concept

of "malleable" man – based on the much-cited "*blank slate*," "*tabula rasa*" – may have appealed to the empiricists because it implied the hope that society could be improved by improving man, but that it may also have been an immunization strategy against the then-current (continental) influence of Catholicism.[724]

Having point by point discussed and (like so many other commentators before him[725]) discarded as unsound the argumentation in Locke's First Book of the *Essay*, Carruthers summarizes:

"*…as we saw in chapter 3, its case against nativism is very weak by comparison. Not only are the direct arguments against nativism unsound, but the attempt to explain how all concepts may arise out of experience itself faces severe difficulties. This is not to say, of course, that nativism is then shown to be true. It is simply that the case against it is unproven. We may then remain puzzled as to why empiricists such as Locke and Hume should have been so convinced, nevertheless, that nativism must be false.*"[726]

Thus, having examined the elements of Locke's reasoning one by one from the viewpoint of contemporary empiricism, or EAN, even an empiricist as outspoken as Carruthers fails to make sense of Locke's arguments against nativism, or *rationalism*; which, understandably enough, leads him to ask why, then, the main proponents of empiricism were so vehemently opposed to the theory of innate knowledge. Of course, we are today probably no longer able to really reconstruct the driving force behind Locke's and Hume's relentless and radical "war" against innate knowledge and innate concepts. What is certain, however – and borne out by all those quotations provided in the course of this text – is that up to the present day, empiricism has unreservedly stuck to this dogma and that the latter, i.e. that all knowledge originates from "*sense experience*" alone and must on no account be innate, has always been an essential element of empiricism's demarcation from *rationalism*.

In contrast, it was already one of Plato's essential insights, as explained earlier in this book, that we must have innate knowledge because without it we would be unable to solve, for instance, geometrical problems. Descartes elaborated on this fundamental idea, bringing to bear innate knowledge and simple steps in thinking as the "*natural light*" and

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724 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 60f.

725 Only some of the most die-hard empiricists manage to get something out of Locke's futile, if not somewhat naïve, arguments in the first Book of his "Essay," e.g. Hartmut Brands who argued that Locke "*actually understood his whole work to be a critique of the doctrine of innate ideas*." Hartmut Brands, Untersuchungen zur Lehre von den angeborenen Ideen, Meisenheim/Glan 1977, p. 51.

726 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 61.

"*simple natures*," respectively. Kant, as indicated, seems to have avoided taking an unequivocal stand but nevertheless clearly assumed that there is *a priori* knowledge – "*functions of the* understanding" (*CPR*, B 94) – and *laws of thinking*, which in terms of methodology, at least from an empiricist point of view, boils down to the same thing, namely that for logical reasons alone, structured previous knowledge must already exist *before* knowledge by experience can happen at all. So, up to now, both "sides," i.e. rationalism and empiricism, have at least agreed to disagree, i.e. to hold opposing views on this point. If, therefore, Carruthers now concedes that there may be innate concepts and ideas, after all, this is something entirely novel. It seems the first time ever that a *declared empiricist* strikes his colors and abandons a central empiricist. Only thirty, forty years ago, when empiricism was at the height of its megalomania, *Wolfgang Stegmüller* qualified Noam Chomsky's novel paradigm as the "*renaissance of the doctrine of innate ideas*." In Stegmüller's own words:

"*There are many empiricists among contemporary philosophers, although few if any who still support the doctrines of John Locke. Yet the great majority even of non-empiricists would readily agree that* Locke made an indisputable contribution – *one that* can never be regarded as 'definitely outmoded' – in his refutation of the Cartesian theory of innate ideas. *It is generally admitted that as a result of Locke's critique the theory of Descartes was relegated once and for all* to the philosophical attic of the 17th century. *At most, only a Kantian variant of the theory, with 'innate' reinterpreted as 'a priori', could still be considered today as possibly worthy of scientific and philosophical discussion.*"[727] (my emphases)

Thus, *nativism* as an essential element of rationalism was since the mid-20th century virtually "dead" and fit to be relegated to the "*attic of the 17th century.*" From the perspective of linguistic philosophy, the then prevailing school of thought, it wasn't even worth discussing. Thus, in a very readable book (edited by Stephen Stich) dealing with the controversy about innate ideas – which had once again gained momentum at the time –, nativism is granted a mere three pages, grudgingly jotted down by W.D. Hart (University College London) who, first of all, asks how on earth innate knowledge is supposed to let us form the *concept of bachelor* (one of Bertrand Russell's favorite examples, along with "the King of France is bald"). Unsurprisingly, he can show that the concept is not innate. Some sentences later, he finally asks how *a priori* knowledge of the type "*A knows a priori that p if A knows that p but A's belief that p can be justified otherwise than by experience.*" His answer:

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[727] Wolfgang Stegmüller, Main Currents in Contemporary German, British, and American Philosophy, Dordrecht-Holland: D. Reidel Publishing Company 1969, p. 528.

"*The trouble is that (without Descartes' God) innateness does not guarantee or even make probable truth; why could not A have been born believing that 2 + 2 = 69? But if the innateness of a belief in no way affects the chances that it is true, then it is foolish to try to explain how A's a priori knowledge that p is justified by saying that his belief that p is innate; (…) Lastly, suppose it were suggested in a final fit of madness that a man has innate justifications for his a priori knowledge. (…) The trouble with this suggestion is that nothing is a justification just because it is innate. (…) In short, for the problem of a priori knowledge, innate ideas are an inane solution.*"[728]

It would surely be a worthwhile exercise for analytic philosophy to explain, linguistic-analytically as well as self-critically, how such arrogance and condescension ("Descartes' God") paired with abuse ("foolish," "fit of madness") and humiliation ("inane") could at all be put on paper by an author whose entire philosophical world can meanwhile be summed up by the question of: "*What remains of analytic philosophy?*"[729] It is interesting to note, in this context, that the *theory of evolution* – a generally accepted scientific theory and certainly not suspected of any commitment to rationalism or idealism – failed to be more fully taken into account by philosophy, or to have more of an influence. For the theory of evolution virtually "lives" on the concept of the transmission of traits, behaviors and skills that are *preserved* (in the Hegelian sense) in the DNA and, thus, innate. My guess is that due to the "double dogma," the strong link between neo-Darwinism and EAN has blocked any further reflection on our mental faculties and the role of heredity even in this field.

Today, innate capacities are comprehensively investigated, and one rather seeks to show that *not all* capacities are innate! Thus, Brian Scholl writes:

"*An online search of the MIT Encyclopedia of Cognitive Science turns up discussions of innateness in almost every imaginable corner, in fields ranging from psychology and linguistics to ethology and neuroscience, and in specific topics ranging from imitation and ethics to numeracy and phantom limbs.*"[730]

It is interesting to note, by the way, that *phantom limbs* as a medical phenomenon was already referred to by Descartes who, in his Sixth *Meditation* and his *Principles of Philosophy*, used it to illustrate a form of decep-

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728 W.H. Hart, Innate Ideas and A Priori Knowledge, in: Stephen P. Stich (Ed.), Innate Ideas, University of California Press, Berkeley and Los Angeles 1975, p. 108f.

729 Peter Bieri, Was bleibt von der analytischen Philosophie? Deutsche Zeitschrift für Philosophie, 2007, Heft 3, p. 333ff.

730 Brian Scholl, Innateness and (Bayesian) Visual Perception, in: The innate mind, (Hg.) Peter Carruthers, Stephen Laurence, Stephen Stich, Oxford University Press, Oxford/New York 2005, p. 35.

tion by the senses where sensory experiences are made although their real substrate (the limb!) no longer exists.[731]

Now, up to this point, we have only asked what may have prompted the empiricists to engage in such a vehement attack on the doctrine of innate knowledge, we have not asked what may have prompted the depraved, hopeless and malevolent rationalists to come to the conclusion that there really is such a thing as innate knowledge and *dispositionally* innate, *universal* and *structured capacities*. Since this innate knowledge is, firstly, not directly accessible in terms of "*sense experience*" and, secondly, does not immediately manifest itself in man the day he or she is born, it has always been considered highly suspect by empiricism. And, on the other hand, it takes great perspicacity and a very creative mind to provide evidence for this knowledge indirectly and by argumentation only. This is why there have been only a few highly intelligent rationalists who had this perspicacity (which Kant, then, had with respect to the *a priori*) and risked an attempt to overcome the no doubt simpler and, at first, more obvious doctrine of empiricism. So, before reengaging with Carruthers' line of reasoning, I propose to follow the birth and development of the *nativist argument in rationalism*.

## The relevance of innate knowledge in rationalism

Reflecting on Plato's argumentation for innate knowledge, Peter Carruthers notes:

"*The most urgent task facing an empiricist is to undermine the case for Platonism.*"[732]

What we have here is the typically negative approach to Plato that is more or less the rule in EAN philosophy – being an empiricist or realist is like second nature, you don't try to understand it, and your first and "most urgent task" is to "undermine" Plato's doctrine and, thus, eliminate the risk of having to find out what Plato actually meant and what his teachings really are about. Never mind that the much more appropriate approach would be to at least try to understand *why* Plato insisted on "*innate*" knowledge and why philosophers such as Plato, Descartes, Leibniz

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731 René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 53; Descartes, The Principles of Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985; see also Tommy L. Lott, Descartes on Phantom Limbs, Mind & Language, Vol. 1, No. 3, 1986.

732 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 33.

or Kant and Hegel were convinced that *sense experience alone could never suffice* to ensure *necessary* and *universal* knowledge and that grasping, understanding, recognizing novel connections could not be the result of a gradual accumulation of "*simple ideas*" as Locke falsely believed to have observed in himself. Rather, what is needed is a kind of "transcension" of current knowledge (Ernst Bloch), a sudden insight by "leaps" or, in the final analysis, synthetic judgments relying on certain natural preformations. Another type of critical approach can, for example, be found in Stephen Stich's 1975 reader "*Innate Ideas.*" In his introductory reflections Stich starts out from a metaphor used by Descartes to describe *innate knowledge* by comparing it to a *disposition*, an *innate disease* that is *hereditary* in some families and manifests itself only at a certain age. Having explored this metaphor from every possible angle, e.g. asking whether there might be hereditary diseases that fail to manifest themselves at all or of which one could heal before they could manifest themselves, Stich then refers back to the Humean term of "*beliefs*," that is of no relevance whatsoever for understanding Descartes, and finally launches his challenge to the assumption of "innate ideas." This linguistic-analytic approach spares him the necessity of really engaging with Descartes' deeper reflections; still, he cannot dismiss him lock, stock, and barrel:

"*We discovered that the analogy is not so straight forward as Descartes may have thought. For buried in the notion of innate disease is an appeal to the normal or natural course of events. And while our intuitions about what is normal or natural serve passably well when we attend to innate disease, the same intuitions yield an intolerably broad notion of innate belief.*"[733]

Thus, the innate-disease example is accepted in its naturalist meaning as a biological phenomenon but dismissed as too vague for the world of "beliefs." Curiously enough, this suggests that mental activities cannot be brought in line with biological activities; which is an interesting stand for a naturalist who would certainly not accept Descartes' alleged "dualism" but at the same time allows for something of a dualism between biology and belief! Descartes, however, was already on the right track. Descartes, following up Plato's philosophy, paved the way towards a *natural* explanation of this innateness by his analogy of the hereditary disease, thus anticipating the solution to Plato's problem, which today is becoming increasingly apparent, as early as in the 17th century. At any rate, from my point of view and as an example, a hereditary disease that is running in a family is a very good means of explaining the phenomenon because, firstly, these disorders really exist; secondly, they are biological phenomena and may manifest themselves symptomatically at birth or later, as the case may be;

[733] Stephen P. Stich (Ed.), Innate Ideas, University of California Press, Berkeley and Los Angeles 1975, p. 13.

and, thirdly, the symptoms of these disorders are *genetically* determined and, thus, the same whenever they occur. There is a wide-ranging discussion today about what *genetic information* is supposed to mean, in the first place, how this information is channeled in the course of evolution, how change occurs and what may be the role of environmental factors not inscribed in the current DNA – all of which will be discussed later in this book. In the 17th century, however, this was still way beyond the horizon, but Descartes' reference to our understanding as the "*natural light*" and to "*simple natures*" that are grasped in the act of understanding clearly shows that he posited a basic structure of thinking that is *natural* and *innate*. This is also why he chose the metaphor of the *familial* and, thus, *hereditary* disease. The obvious downside of the example is that since an innate disease is not a mental faculty it of course operates at a different level.

For Descartes, however, this example was just a metaphor that he used to illustrate the principle of innate knowledge, which allows us to propose a first *definition* of *innate faculties* and *innate knowledge*: *innate knowledge is dispositionally inscribed in the genes and capable, at the appropriate time and in the pre-structured way, of a directional development*. Some knowledge *exists structurally – potentially* – but does not necessarily manifest itself at birth, or before full maturity is reached. So, unlike what Locke assumed, *knowledge* that is innate need not be evident at birth; rather, the structural bases of mental capacities are a *genetically* inscribed potential that may not be activated until much later, just as, at the biological level, pubic hair. Obviously, there is no such thing as pubic hair at birth, insofar Locke is right, but this is exactly what *inscribed as a potential* means: that the phenomenon will take time to manifest itself but will always result in pubic hair, not dragon scales. Of course, all this is still rather vague, and the basic problem here is that this knowledge, for all its being *inherent* and *predetermined*, will not necessarily develop "automatically." Rather, it will be activated situationally, *dispositionally*, and within a certain time slot and a certain "range" or "scope." The problem, and at the same time the essential nature, of this complex situation, however, is that there is no straight, analogous, monocausal line leading from innate biological structures to the representations, thoughts or concepts of the mind! It's like in the example, previously referred to, of the finger tap on somebody's shoulder: there is a biological component and *at the same time* a mental one that, within the limits of what is structurally possible, depends on the former but nevertheless turns out to be "*entirely different*" in kind – namely spontaneous, creative, situational within the limits of what is logically possible.

Another example is the computer with its *preinstalled* program. Not every feature or function of this program will be activated or used by every user. Also, data input will vary among users and the program will

process and organize a wide variety of texts, images, programs, data. But at the same time, the *operating system* will in principle *always* carry out the same *functions*, and yes, it may at times fail to operate, and yes, one may make mistakes when using it, and yes, one may interfere with or undermine it, and yes, without the data from the outside world the system will not be able to fulfill its function, but it will nevertheless always remain the *identical operating system of this series* and this *computer generation* and carry out *identical* operations, and its structure will not be built from the data coming from outside – it is preinstalled, "innate." With this in mind, let's now follow the development of the notion of innate knowledge, step by step, and starting with Plato.

## The origin of the doctrine of innate knowledge in Plato

In our discussion of *rationalism*, we have already noted that Plato can quite rightly be described as the real father of the doctrine of innate ideas. In his "Meno" and "Phaedo" dialogues as well as some passages of the "Republic," he expounded the insight – probably already tracing back to Socrates – that if we seek to know something, for instance whether two sticks differ in length, i.e. are *dissimilar*, we need to already have the concept of *similarity* as such, or else there would be no way for us to know this. For it is easy to understand that while we can see that the two sticks differ in length, the *concept of similarity* or, in this case, the *concept of dissimilarity*, is nothing we can perceive. And this holds for all such situations. Oliver Hallich illustrates this fact as follows:

"*Judging, for instance, two stones as similar means that for us to be able to come to this judgment at all necessarily presupposes our having a concept of similarity that is not derived from sensory data. Similarity itself belongs to a type of concept that implies perfection insofar as it represents what is only imperfectly perceived by us in nature without the distortions of empirical perception, and a concept that implies a standard insofar as the latter needs to be presupposed if we are to have any criteria at all for using terms such as 'is similar' in empirical judgments about relations of similarity*."[734]

In the "Meno" dialogue, Plato paradigmatically shows that if guided by questions that steer him towards an awareness of "*simple natures*," a person lacking *acquired* knowledge is able to find the solution to a relatively difficult geometrical problem *in and through himself*. Plato conceives of this cognitive process as "*recollection*" because there still is the open question of where this "previous knowledge" of *similarity* or *dissimilarity*, *identity* or *non-identity*, etc. is supposed to come from. Since, however, it

[734] Oliver Hallich, Platons 'Menon', Darmstadt 2013, p. 131f.

could be activated in the test person by these questions, there is only one explanation left, namely, that at least "parts" of the solution, that is, the *understanding of function* or the *concept of function*, must unconsciously have already been there and were "retrieved," as it were, by adequate questions from the supposedly ignorant person. The important point with these solutions found by way of *geometrical problems* is, firstly, that *any normally endowed person* would have been able to find them, which is a strong argument for the *universality of the innate "natural light*," and, secondly, that the solutions thus found are "universally understandable" and "correct." In terms of the visual turn, this suggests that geometrical problems might be a prime example for showing that the solutions of this type of problem are easy to "*see*" (think) and, at the same time, are based on visual thinking which, although it comes to be expressed in terms of concepts, originates in the visual domain and yet is more than mere seeing. Julius Stenzel summarizes this fact as follows:

"*Whoever is familiar with the Meno and Phaedo knows Plato's predilection for mathematical figures as a means of demonstrating the participation of the particular in the universal. What characterizes mathematical intuition is that the particular case does not only represent other cases of the same kind but something definitely other, something "higher," an immediate certainty. So, there can be no question of abstraction from particular cases; rather, even in archaic thinking mathematical problems will lead to the insight that unless there is something of a higher order, the particular thing cannot be recognized as something 'on which we set this seal' of being 'that which it is,' as Plato says in the Phaedo; and since, on the other hand, archaic thinking does not lend itself to a representation of this universal – the mathematical in the broadest sense – in terms of concepts, or definitions, while visual representation is easy, this thinking always tends to fall back on what is particular and concrete and, thus, to be informed all at once, at a glance, (…) by an overview, of the content of the universal.*"[735]

This argumentation is interesting in more than one respect. On the one hand, it emphasizes the relevance of *geometry*, and more particularly its essential capacity of bringing it home to us that there is no way to think the particular but *through the function of the universal*, and that the latter is by no means obtained by induction from particular cases, while on the other hand, this *function* cannot be apprehended unless we fall back on what is *concrete*, *intuitive*, visual – "*thus, to be informed*," in Stenzel's words, "*all at once, at a glance, (…) by an overview, of the content of the universal*." Once again, the involvement of the *visual* element (*glance*, *overview*) in the cognitive process is highlighted, as well as the fact that all of this happens "*all at once*," as Stenzel so aptly says, which accounts for both the *all at once* of Descartes' intuitive evidence and the *suddenness* of the aha!-experience. At the same time, this suggests an *understanding of*

[735] Julius Stenzel, Über den Aufbau der Erkenntnis im VII. Platonischen Brief, in: Kleine Schriften zur griechischen Philosophie, Darmstadt 1956, p. 14.

*function* that enables us to gain universal knowledge through *sudden insight*, without language.

Also, in the "Meno," the important question arises of whether we can search for what we do not yet know. Here's Plato's reply by Socrates:

"*As the whole of nature is akin, and the soul has learned everything, nothing prevents a man, after recalling one thing only – a process men call learning – discovering everything for himself, if he is brave and does not tire of the search, for searching and learning are, as a whole, recollection*."[736]

In the course of his investigation, Plato had realized that for cognition to happen we obviously need to bring along certain preexisting forms, since ideas (in the sense this term is used in rationalism) cannot be "read off" from sense experiences. Led on by the mythical idea of reincarnation, arguably a result of his Egyptian travels and his proximity to Pythagorean thought, he comes to the conclusion that the soul must have "seen" these principles and ideas already before birth and that knowledge is gained by their being "recollected" in the cognitive process. This, of course, is a serious inconsistency in Plato's otherwise logical and clear reasoning. But he also says something remarkable in this context, namely, that "the whole of nature is akin" and "the soul", therefore, "has learned everything." This is interesting indeed, for Plato makes recourse to "nature" – something we already found in Descartes' *natural light* – and refers to the soul's *kinship* with nature that links it to universal knowledge. And since *akin* is not that far from *inherited*, a non-mythical interpretation in terms of the previously outlined evolutionary-biology interpretation becomes at least conceivable. Thus, the way to this "*evolutionary*" *interpretation* is at least open, corroborating my previous attempt to incorporate it into the original text – not as an interpretation of Plato's text but as a contemporary extension of his reasoning. There is no need to disqualify and "undermine" Plato on the grounds of this mythical reincarnation, as in the standard EAN approach since the 20th century.

Yet there is no denying that Plato offers this mythical explanation, which is why I'd like to draw attention to another meaning of *recollection*, namely in the sense of cognition, for there are two important points I'd like to make in this context. Firstly, the birth of rationalism in Plato does not happen under the banner of mythical thinking. Rather, *the mythical explanation is the consequence of a logical conclusion and a logical requirement*. This logical discovery, then, goes on to provide the groundwork for a priori thought that has ever since remained the basis of rationalist thinking and is currently gaining new momentum in the theory of evolution. And the answer given to the problem of the a priori will, in turn, lead to

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[736] Plato, Meno, in Plato, Five Dialogues: Euthyphro, Apology, Crito, Meno, Phaedo, Indianapolis/Cambridge: Hackett Publishing Company 2002, p. 71.

the insight that preformed ideas, forms, gestalts, categories, etc. must *of necessity* exist *a priori*, that is, prior to experience. Rationalism, thus, was not born as a mythical concept, it was the result of stringent logical reasoning, arising from Plato's absolutely consistent reflections and conclusions. Another important point that highlights the intellectual superiority of rationalism over the competing philosophical currents in ancient Greece is its refusal, in contrast to what seems obvious to naïve realism, to trust in *sense experience* as a basis of cognition. Already at birth, rationalist thinking thus rose above the thinking, current at the time, that was committed to what is palpable. From the very start, rationalism has been logical, questioning, investigative, consistent, oriented to reason, geometry, the sciences, it has never been mythical, naïve, superficial, it has never made itself a "slave of sense experience." But how to interpret "recollection" in a rational way without knowledge of the theory of evolution and the genetic transmission of what is, then, innate knowledge?

In his *Discourse*, Descartes, outlining the process of gaining new knowledge and solving problems, argues that to be able to *clearly* and *distinctly* grasp the "*simple natures*" by the *intuitive evidence* of the *natural light*, we first need to strategically organize a problem according to his famous four methodological rules and break it down into its *most simple elements* so we can, then, solve the individual elements of the problem by means of our understanding, in a tactical step-by-step process. This means that when dealing with geometrical problems we need to grasp and logically organize, separately and step by step, the simple logical facts, connections and relations – this is where two lines will intersect in their extension, here we have a right angle, this is where the circle and the tangent touch, here a surface doubles, there the diagonal divides, etc. And this activation of *logical patterns* in view of solving a given problem could also be construed as *recollection*. It would, then, be the activation of knowledge that potentially exists but is currently not consciously accessible, just as, e.g., the *deep structure* of universal grammar. Speaking our mother tongue, for instance, we will not build each sentence by consciously applying, due to *drill* ("Abrichtung," Wittgenstein) and inculcation or "*training on the part of society*" (Quine), its grammatical rules. We are not even aware of them while speaking, we apply them unconsciously, relying on the structure of universal grammar that we have in us. In this sense, we unconsciously "recollect" knowledge we already have, even though "recollection" and its connotations may not really be the ideal way to describe the process. The principle of the argumentation and the entire doctrine, however, is easily comprehensible.

Most experts believe that the doctrine of "recollection" as a form of *a priori knowledge* is deliberately introduced in the "*Meno*" dialogue in view of its further development in the "*Phaedo*" – the unfolding of a theory, as

it were. In this logical development, "Plato's problem" leads to the doctrine of recollection, which in turn leads to the realization of the a priori nature of knowledge and, from there, to the *doctrine of forms* and the concept of *participation* (methexis). And the doctrine of forms will in the final analysis – if we accept Ernst Cassirer's brilliant solution – lead to the *concept of function* (I'll leave aside the entire debate about the separate and independent existence of forms, or ideas, because I believe that there is another, more adequate solution). As we have previously learned from Arbogast Schmitt's discussion of Plato and Aristotle, the constitutive element that allows us to grasp the nature of a thing is its – never visible – *work* ("*ergon*"), *activity*, *function*, it is never what can be seen on the outside, it is what we need to grasp in order to understand a fact, or set of facts:

"*This is the basic meaning of the distinction introduced by Plato and later taken over by Aristotle, namely, that one recognizes a thing not in terms of the sensory data we have of it, but in terms of its 'work' (*ergon*), its activity or function. The latter one does not see, hear, or feel but understands*."[737]

In his essay "Learning as recollection," Julius Moravcsik highlights another essential element of the rationalist "primal scene" – the aspect of "*learning.*" For, basically, what the *Meno* is about, after all, is to show how we can *learn something new*. This is not about learning as memorizing, or copying, it is about how to solve a problem, that is, gain *new knowledge* that we did not consciously have before; which, once again, means that Plato's problem, or *paradox*, as Moravcsik calls it, comes into play: *how can we find what we do not know, and how, having found it, can we know that we have found it since we did not know it*? Plato, Moravcsik argues, deliberately opted for a build-up of the problem across both dialogues that precludes any solution by empirical induction:

"*… although Plato places no explicit limitations on the paradox, he discusses it and the recollection thesis only in connection with what he takes to be a priori inquiries. This, in conjunction with our analysis of the nature of the paradox makes it reasonable to assume that both the paradox and its proposed solution are interpreted by Plato to apply to a priori contexts only.*"[738]

In the further course of his deliberations, Moravcsik consequently addresses the issue that logically follows from this, namely, that there is knowledge that obviously exists already before birth; which leads to the

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737 Arbogast Schmitt, Modernity and Plato: Two Paradigms of Rationality, Camden House 2012, p. 97.

738 Julius Moravcsik, Learning as recollection, in: Plato. A collection of critical essays, ed. Gregory Vlastos, Anchor Books, New York 1970, p. 56f.

issue of the innateness of the basic forms of knowledge that potentially exist in the mind. Moravcsik:

"*We can see from this that the claim that we have a set of concepts and beliefs given innately to our minds such that given proper stimulation (and stage of maturation) these can be brought to consciousness, is crucial to the recollection thesis if it is to have any explanatory power at all. Evidence that Plato construed his thesis in this manner is provided by (Menon) 85C4-5, where Socrates says that recollection involves bringing out in people beliefs that were in a sense in them all along. The theory of innate ideas can be derived from the recollection thesis by dropping the historical feature and modifying the entitative aspect. For the theory thus construed can be understood as the claim that the mind is furnished innately with a set of concepts which it contains in a way analogous to the way in which what is remembered is stored in the mind.*"[739]

Moravcsik's deliberations show that Plato's problem, or paradox, logically leads to *a priori* existing knowledge, which leads to the *innateness* of this knowledge in some reproducible form, which in turn leads to the *universality* or *reproducibility* of these *forms* (ideas). Rationalism was not inspired by a myth but by a series of very precise observations and logical conclusions. Paul Natorp, too, emphasized that learning by "*recovering knowledge we already have*" was an important aspect also in the *Phaedo*:

"*The prevailing idea that insight can only be gained by retrieving it from the depths of one's own mind is also the crucial point here; learning, gaining knowledge, is recovering knowledge we already have (…). 76E: we find the existence of the pure forms of thought as something that we already possessed, something of our own (…) 92D: this Sein is inherent in our consciousness. But in contrast to the Meno, drawing on one's own consciousness is much more strictly limited to the pure forms of thought in the Phaedo.*"[740]

We have already noted that Plato's movement of thought creates the impression of being conceived of, in Natorp's words, "*as something that we already possessed, something of our own (…) 92D: this being is inherent in our consciousness.*" Even though this interpretation deliberately foreshadows Kant in a way that is not really warranted by a more neutral construal of the text, the argumentation clearly points to the a priori categories of thought rather than a separate "realm of ideas." Also, Natorp has been criticized for his tendency to interpret Plato from a Kantian perspective, so it may be helpful to once more quote Moravcsik who comes to the same conclusion:

"*Thus recollection takes place on two levels; the slave boy is recollecting geometry, and Meno is recollecting what learning is. The parallel shows that Plato's theory of learn-*

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739 Julius Moravcsik, Learning as recollection, in: Plato. A collection of critical essays, ed. Gregory Vlastos, Anchor Books, New York 1970, p. 59.

740 Paul Natorp, Platos Ideenlehre, Eine Einführung in den Idealismus, Hamburg 2004 (1903), p. 142.

*ing is meant to be an a priori thesis. (…) With regard to these conditions Plato's argument seems to take the following form: given that there is successful inquiry into a priori matters, and given the nature of such inquiry (illuminated negatively by the learner's paradox) together with certain general facts about human learning conditions, learning within this restricted scope must be like recollection. This structure is very similar to the structure of Kant's transcendental arguments.*"[741]

Once more, the line from Plato to Descartes and Leibniz to Kant regarding *a priori* existing knowledge becomes apparent, the connection seems relatively obvious and plausible. So, once this argumentation is accepted as cogent, a last – if even more difficult – step remains to be taken to obtain a precise description and characterization of this obviously, somehow or other, pre-formed knowledge. For it is, of course, unsatisfactory to extrapolate from a problem or paradox to a fact without having a precise and comprehensive understanding of its structure. How to describe abstract phenomena – ideas, categories, knowledge – that are hidden in the depths of the mind and supposed to exist even before birth, let alone describe them with the mental tools of ancient Greece? At any rate, the existence of pre-formed knowledge having been successfully observed and established, the *Phaedo* dialogue takes the reasoning developed in the *Meno* a decisive step forward by exploring the structure and form of this innate knowledge. For the a priori structure of the knowledge does not per se tell us anything about the form of this knowledge. Norman Gulley has contributed some illuminating thoughts to the issue:

"*The important thing to note here is that Plato's theory of knowledge as a priori is initially quite independent either of a theory of Forms or of any theory about the nature of sense-perception. It is only when he tries to give greater precision to his theory of knowledge that he introduces, as a newly developed doctrine, a doctrine which tries to give a more clear-cut distinction between a priori knowledge and non-a priori levels of apprehension by basing it on a distinction between non-sensibles and sensibles, and, from the epistemological point of view, between concepts and percepts. This is the significant development made by the theory of recollection in the Phaedo, which makes for the first time, a distinction between sensibles and transcendent Forms.*"[742]

Thus, the logic of innate knowledge has yet another consequence that is typical of rationalism, namely, that if there are *innate ideas* or *forms of thinking* that will always, with every thinker and under the same conditions, lead to the same result, then we need to clarify the relation between these *forms of thinking* and the sensory perception of objects that results from their co-presence in our cognition, i.e., the relation between *innate forms* and *sense data*. Thus, Plato does not forget to point out that sensory

741 Julius Moravcsik, Learning as recollection, in: Plato. A collection of critical essays, ed. Gregory Vlastos, Anchor Books, New York 1970, p. 63.

742 Norman Gulley, Plato's Theory of Knowledge, Methuen & Co, London 1962, p. 27.

perceptions are needed for the mind to initiate or retrieve these *forms* (Phaedo 74–76).

Another consequence is the model of *a priori*, *potentially* existing, *fixed* and, at the same time, *structured mental forms* that are *universal*, *schematic, model-like* and *foundational* in character and are "triggered" by sense experiences. This *knowledge* is *latent* because it will only be applied and become manifest when triggered by perceptions or problems, not unlike a grammar that is applied – unconsciously, in most cases – in speaking but can nevertheless be filtered out and formalized. This is also the reason why we have this knowledge only *potentially*, because not every idea or form will necessarily be applied by every human being. And it is *fixed* and *structured* insofar as, being an *innate* and constant *form* that, in principle, exists in every soul (let's for the time being leave aside the question of the origin of this pre-formation and whether or not it is really unchangeable), it allows us to gain an insight that is certain by its very nature. In Plato, the formalization of this model arguably does not go beyond saying that the ideas exist "by themselves with themselves" although his Seventh Letter, already previously quoted, suggests that he "locates" them "*in the soul*," which would definitely mean that the entire doctrine foreshadows Kant. The ideas are *universal* because, not unlike grammar, they apply to all human beings in all situations and all worlds, and they are *schematic and model-like* insofar as they structure the formation of insights from sensory perceptions. In terms of sensory stimuli, the circle may be red, green or blue, small or large, made of iron or wood, the points of its circumference will always be equidistant from its center. This is the *idea* of the circle, its *definition*, its *law*. It can only be *thought* by means of these universal forms, the ideas, and never by observation and sensory perceptions. And the forms, or ideas, are *foundational* in the sense that we already need to have the *concept of similarity* to be able to distinguish similar and dissimilar objects, we already need to have the *concept of unity* to be able to expect and identify entities in the chaos of sensations, the concept thus being *foundational* for perception and understanding to be possible at all. All these properties, connections and logical inferences are inevitable once we have made the first step, that is, understood that sense experiences alone can never suffice to enable insight.

Thus, the state of our exploration of *innateness* would seem to be as follows: *innate* in *Plato* means *knowledge* that already exists and is structurally formed in the mind *before* birth and is *latently* accessible to all humans, namely as *universal forms* that are always already "on board." Once the mind has reached full maturity, the thinking person sees with "*the eyes of the mind*" and, in thinking, applies these latent ideas, or forms, to the world that he or she (naively, as far as Plato is concerned) perceives by means of the senses. This "*seeing with the eyes of the mind*," the *eidetic*,

then comes to be expressed in the concept of *eidos*, from which the concept of *idea* is ultimately derived. *Eidos* can even be taken to suggest something like *visual thinking*, a capacity that also plays an important role in Plato's preferential geometrical examples. At any rate, *Euclidean geometry* is where all of this converges: *visual thinking*, the famous examples offered by Plato, Descartes, Kant and, albeit at a lower level of reflection, Berkeley and Hume, but also the gestalt theory of seeing and the current research in vision science and nativism – a line we will further explore in the chapter on visual thinking in geometry.

What I hope to have shown by this introductory exposition of the logical development of the basic Platonic idea is that the entire doctrine of innate, a priori and universal knowledge that already exists before birth did not primarily spring from a mythical belief, nor from some arbitrary conception that was *subsequently legitimized* by the appropriate arguments but that, inversely, the *beginning of rationalism* was the logical result of a sequence of crystal clear, mutually dependent steps in reasoning. As for the rational basis of this argumentation – namely biological innateness – ancient Greece simply lacked the scientific means since clues and findings that attest to its existence have only recently started to accumulate, constituting a growing "body of evidence." Our next step, in turn, will be to see how Plato's initial conception was expanded by Descartes who, after the stagnation induced by dogmatic Aristotelian thinking in the Middle Ages, gave a new impetus to Plato's pivotal idea.

## The doctrine of innate knowledge, or the "*natural light*," in Descartes

Descartes' entire doctrine, as we have repeatedly explained, builds on the insight that to understand the laws and connections of nature and gain certain knowledge about the world of things and about ourselves, we can ultimately rely on our innate understanding and reason. In this context, Descartes conceives of mathematics (*mathesis* universalis) and, primarily, *geometry* as the universal instrument that enables us to apprehend and elucidate problems in the field of technology and physics. Thanks to geometry, Descartes was the first scholar to understand and publish the law of refraction, or to analyze the geometry of vision in his – typically underappreciated – *Optics*. Geometry also made him realize that the two-dimensional, right-left-inverted and upside-down image on the retina could never suffice to account for the size and object constancy of the things we see, thus invalidating empiricism's naïve *theory of ideas*, already discussed in the chapter on vision. *Geometrical-mathematical* insights and observations such as these led him to the conclusion that the visual images we see could not be explained by the sensory stimuli of perception alone. Thus, it would seem that quite early on, that is, when working on

or perhaps even prior to his "*Regulae*" he came to a clear understanding of some basic truths that were subsequently enlarged upon or modified but never abandoned! These insights include the concepts of *clearness* and *distinctness* (or the state of being *adequately differentiated*) as criteria of truth, or the fact that the *self-conscious mind* can never be understood in terms of simple causal stimulus-response mechanisms and is, therefore, by its very nature "*entirely different*" from the physical world. The cornerstone of his construction, however, is the doctrine of *innate knowledge* although this is also the tenet that posterity, friends and foes alike, found particularly hard to accommodate. One reason for this is that while his intention is not hard to understand, his argumentation tends to vary in its phrasing or accentuation, thus giving occasion to misleading interpretations of his concept of innateness. This is why generations of critics have tried to use it as a leverage, and this is why Descartes' writings have to the present day been time and again subjected to special treatment by linguistic-analytic philosophy.

A seeming lack of clarity results from the fact that at certain early stages of his argumentation in his most famous and primarily interpretive text, the *thought experiment* of the *Meditations* (and most prominently so in the *Third Meditation*), Descartes discusses the different kinds of *ideas* that *at this point of the experiment* come to his mind. He notes that, at this stage of his *Meditation*, there appear to be three kinds of ideas within himself and offers some reflections on this fact, expressing himself in very cautious and tentative terms:

"A*mong my ideas, some appear to be innate, some to be adventitious, and other to have been invented by me. My understanding of what a thing is, what truth is, and what thought is, seems to derive simply from my own nature. But my hearing a noise, as I do now, or seeing the sun, or feeling the fire, comes from things which are located outside me, or so I have hitherto judged. Lastly, sirens, hippogriffs and the like are my own invention. But perhaps all my ideas may be thought of as adventitious, or they may all be innate, or all made up; for as yet I have not clearly perceived their true origin*."[743]

Now, this passage is frequently used be EAN philosophy as a starting point for the said linguistic-analytic special treatment, thus complicating and obscuring Descartes' arguments notwithstanding the fact that he expresses himself in very clear and simple terms and makes it quite clear, in the last sentence, that this is a tentative insight and that nothing definite can as yet be said.

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[743] René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 26.

In this passage, Descartes suggests that there are *innate ideas*, a term largely equivalent to the *seeds of reason* previously referred to, and that he is also aware of other *ideas*, or contents of consciousness, that seem to originate from external bodies, as well as ideas "*invented by me.*" But he also adds – and this is usually glossed over – that at this point of his reflections, the relative prevalence of each type of ideas is far from being clear. There is one term in this statement, however, that differs from those found in other passages previously quoted, namely "*innate ideas*" rather than "*faculties*" or "*dispositions.*" So, whoever is looking for an excuse to stop reading might construct an inconsistency here. But whoever goes on reading will find that Descartes' reasoning will successively be clarified as he subjects these ideas, or contents of consciousness, that seem to originate from external things to a more detailed examination. Here's what he says:

"*…: now, for example, I feel the heat whether I want to or not, and this I why I think that this sensation or idea of heat comes to me from something other than myself, namely the heat of the fire by which I am sitting. And the most obvious judgement for me to make is that the thing in question transmits to me its own likeness rather than something else*." (loc, cit.)

This insight is remarkable insofar as we have seen that the empiricists used to postulate a primitive copying process of given sense impressions that provide a fixed content we passively and inevitably absorb. Descartes, in contrast, thinks that what emanates from things is a "*likeness*" that needs to be deciphered. And now comes the essential point that brings everything into line and explains it all. For this is the line of thought now pursued by Descartes: if we cannot copy the things such as they are *in themselves*, and if they come to us in the form of a "*likeness*" (read: model, idea, gestalt), then there must be some *contribution from our thinking* that enables us to apprehend these things so as to reliably understand and grasp their nature, essence, *function*! The contribution that comes from self-conscious thinking, however, cannot originate from the perceived objects alone and must, therefore, always already be in our mind, that is, must be innate at least as a structure or a disposition. This reasoning, if approached with an unbiased mind, should not be hard to understand. Descartes, then, further differentiates:

"*And finally, even if these ideas did come from things other than myself* (Descartes here refers to the ideas we receive of external things, and to the fact that up to this point, there is no way for us to understand in what form these things can be known by us; my note), *it would not follow that they must resemble these things. Indeed, I think that I have often discovered a great disparity <between an object and its idea> in many cases. For example, there are two different ideas of the sun. One of them, which is acquired as it were from the senses and which is a prime example of an idea which I reckon to come from an external source, makes the sun appear very small. The other idea is based on astronomical reasoning, that is, it is derived from certain*

*notions which are innate in me (or else it is constructed by me in some other way), and this idea shows the sun to be several times larger than the earth. Obviously both these ideas cannot resemble the sun which exists outside me; and reason persuades me that the idea which seems to have emanated most directly from the sun itself has in fact no resemblance to it at all.*"[744]

This beautiful piece of reasoning which starts out from the question of the *origin of our ideas* to offer an *in nuce* description of the difference between the *thing in itself* and the *thing for us*, thus clearly anticipating Kant, leads Descartes to conclude that for us to be able at all to grasp the "true" idea of the sun, the "*likenesses*" or ideas that come "*from an external source*" (and which, it should be noted, are not denied) need to be complemented by the thoughts and concepts of the mind itself. In Descartes' terms, this idea is "*derived from certain notions which are innate in me (or else it is constructed by me in some other way).*" While this is still vague, it does mean that for us to gain true knowledge of the world – to make sense of the "*likeness*" – the ideas that are due to sensory perceptions need to be structured and organized by the ideas of the understanding, and that the latter ideas must be assumed as pre-existing even though the formulation "*constructed by me in some other way*" leaves room for more than one option as to their origin. These "*innate notions*," however, are nothing else but the *result of the application of the natural light* in terms of *simple natures*. So, what the example of the idea of the sun is meant to show is that in contrast to those notions or ideas of the sun that originate from sensory perception, the notions or ideas that result from geometrical-astronomical considerations are formed by an insight into the *simple natures*, an insight we can only gain by means of our *natural light* which, however, we are always already endowed with. Thus, these notions or ideas are *functions*, or at least *functional in nature* – just as every sentence by which we describe objects will contain elements that originate from perception whereas the *grammar* that underlies the syntactical organization of the terms needed for this description is provided by our innate universal grammar. And this holds for the case of the sun as well as for any other case. Deborah Boyle offers a very plausible explanation of this fact:

"*However, I shall argue that for Descartes, innate ideas can be in the mind without yet being the actual objects of any occurrent act of thought. That is, for innate ideas, the material and objective senses of 'idea' are less closely related: an innate idea can be present in the mind (that is, we can have an innate idea$_0$ without there being any act of the intellect by which we perceive it (that is without there being a correlative innate idea$_m$). This suggestion may seem unintuitive. However, it allows us to make good sense of the various passages in which Descartes suggests that we can have innate ideas*

[744] René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 27.

*which we haven't yet noticed. (…) We can easily make sense of Descartes' claim if we take him to mean that we may have an innate idea$_0$ without yet having a correlative innate idea$_m$.*"[745]

(Following Vere Chappell, Deborah Boyle here distinguishes between idea in the material sense = idea$_m$ and idea in the objective sense = idea$_0$ in Descartes, which more or less corresponds to my distinction between the idea of the sun provided by the senses and the geometrical-astronomical, objective idea, even though I feel that this introduces a distinction that ultimately can only be thought in terms of the consciousness, the innate light, i.e. of understanding and reason, and should not be naturalistically "objectified.")

This reading of Descartes' conception of innate ideas as set forth in his *Meditations* gains in plausibility if we once more return to – and approach in the spirit in which they were conceived – the *Regulae* he started writing as early as around the year 1620 but never published himself. There, Descartes refers to the understanding as the "*light innate within us*"[746] and quite clearly states:

"*But I am convinced that certain primary seeds of truth naturally implanted in human minds thrived vigorously in that unsophisticated and innocent age – seeds which have been stifled in us through our constantly reading and hearing all sorts of errors. So the same light of the mind which enabled them to see (albeit without knowing why) that virtue is preferable to pleasure, the good preferable to the useful, also enabled them to grasp true ideas in philosophy and mathematics, although they were not yet able fully to master such sciences*."[747]

Whoever is willing to read this statement without prejudice will have no doubt that Descartes unequivocally speaks of "*certain primary seeds of truth naturally implanted in human minds*," that is – if we go along with the biological metaphor of "seeds" – of "*naturally implanted*" and (hereditarily) pre-structured elements in us, elements that are adequate, in character, to this nature that is conceived of as purposeful, and can therefore guide us towards correct solutions. This is further corroborated by the significant reference to Plato and Cicero (stoicism) and the application of mathematics in ancient Greece (Pappus). Besides, there is a passage in the Fifth Meditation where Descartes, following Plato, correlates the search for truth in himself with *recollection*:

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745 Deborah A. Boyle, Descartes on Innate Ideas, Continuum International Publishing Group, London/New York 2009, p. 12f.

746 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 22.

747 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 18.

"*…, but in addition there are countless particular features regarding shape, number, motion and so on, which I perceive when I give them my attention. And the truth of these matters is so open and so much in harmony with my nature, that on first discovering them it seems that I am not so much learning something new as remembering what I knew before; or it seems like noticing for the first time things which were long present within me although I had never turned my mental gaze on them before*."[748]

Unmistakably, there is resonance with the mode of *recollection*, but also a reference to "*gestalt*" ("*shape*") and, then, "*nature*" and the "*mental gaze.*"

As a concrete way of applying this innate *natural light*, that is, the understanding human beings are naturally endowed with, Descartes then introduces a strategic method and tactical application that he must have become aware of when solving geometrical problems. This strategy corresponds to the four rules, previously described, of the *Discourse*, namely to accept nothing as true but what results from *clear* and *distinct* (*adequately differentiated*) cognition, that is, to rely on critical rationalism; to break down problems into their smallest possible units and start with the easiest ones, that is, to rely on the *simple natures* to step by step disentangle nature's initially confusing and seemingly impenetrable texture; furthermore, to follow an orderly approach, that is, proceed systematically by exactly numbering and cataloging problems and steps; which brings to mind the Standard Operating Procedure (SOP) and the study protocol used in modern laboratories. The direct "grasping" of reality by thinking is to be conceived of as apprehension in terms of *simple natures*, i.e. retaining those relations and connections that, intuitively and *all at once*, clearly and distinctly make sense. Here, however, we come up against a crucial difficulty that needs to be clarified, namely, how to understand these *simple natures* in their relation to *innate ideas*.

The best way to make this relation plausible is, I believe, to once more use the case of the circle and a conceptual, perception theory-based approach. According to Plato's argumentation in his Seventh Letter, human perception and recognition of the circle happens as follows: if there is a more or less circular arrangement of points in our field of vision, the *gestalt laws* of perception make us see these points as a *good* or *simple form*, that is, project a Euclidean circle onto them and complete the circumference wherever it is incomplete. In the chapter on vision, I have described how we rely on these innate laws of gestalt to solve vision's seemingly impossible task of forming objects and gestalts from the theoretically *infinite possibilities* inherent in the image that the sensory stimuli create on our retina. Now, what is innate in terms of the gestalt law that "creates" a circle where actually, in strictly positivist terms, all there is for

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[748] René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 44.

us to describe is scattered points with certain coordinates, is *not* the circle but the workings, or function, of the law as a capacity or disposition. Yet whenever points, lines, stones, celestial bodies are circularly arranged (and although they will never form a perfect circle because there can be no such thing in the real world), they *always* and *of necessity* create the circle in our imagination. As a logical consequence, the *perfect circle*, or the "seeing" of a perfect circle where in actual fact there is none, is achieved by *innate rules*.

By analogy, in the relation between *simple natures* and *innate ideas*, *simple natures* can be conceived of as something like the "gestalt laws of thinking" that help us to clearly and distinctly apprehend (judge as *adequately differentiated*) the *simplest relations* by intuitive evidence. And as a result, we recognize and imagine something that is equivalent to the perfect circle we seem to perceive, the *perfect circle of thinking*, or of Euclidean geometry, that is, the set of all points (in a plane) that are constantly equidistant from a given center, which, however, has been built up, step by step, from the smallest elements of thinking. It is the very same method that in the case of a circle drawn in the sand by Socrates enables his disciples to step by step generate its definition by thinking and to do so *universally* and *necessarily* because they all have the *innate disposition* to think of a circle – which, due to the gestalt laws, they see as such from the very start – as a "simple nature" or, in different terms, an *idea* or, better still, a *concept of function* that necessarily leads them to the definition of the circle. In this sense, and in this sense only, can "the circle" be innate; but – and this makes for the confusion at this point – it can of course not be innate as a fixed *concept* "circle," the word we will use once we have language. Rather, what is step by step created, universally and necessarily in the way just described by the gestalt laws and the visual thinking of intuitive evidence is the *concept of function* of a circle. If we consider the problem of whether or not the concept of the circle is innate exclusively *from* the perspective of the concept, the conclusion is of course in the negative since children are obviously not born with the knowledge of the linguistic concept "circle," and since the concept of circle as a word can obviously not be innate. This is true. But what is innate is the "path" that enables us to step by step, first visually then also in thought, grasp the perfect circle even in the "bad" drawing of a circle in the sand; and in this sense the circle is innate by its *function* as a gestalt and a principle per se even before there is a concept in terms of the word we use to name it. What is innate is the capacity to *dispositionally* follow the path that leads us, guided by the "natural light," from the "seeds of reason" to the concept of function "circle"!

Now Descartes, in his reply to the *Fifth Objections* raised by Gassendi to his *Meditations*, offers some observations that are of interest for the above reflections:

"*But since the idea of the true triangle was already in us, and could be conceived by our mind more easily than the more composite figure of the triangle drawn on paper, when we saw the composite figure we did not apprehend the figure we saw, but rather the true triangle. It is just the same as when we look at a piece of paper on which some lines have been drawn in ink to represent a man's face: the idea that this produces in us is not so much the idea of these lines as the idea of a man. Yet this would certainly not happen unless the idea of the human face were already known to us from some other source, and we were more accustomed to think of the face than the lines drawn in ink; indeed, we are often unable to distinguish the lines from one another when they are moved a short distance away from us. Thus we could not recognize the geometrical triangle from the diagram on the paper unless our mind already possessed the idea of it from some other source*."[749]

The fascinating point in this argumentation is that Descartes compares the projection of the perfect triangle onto the always imperfect, roughly drawn triangle to the perception of a *face* that is represented by some lines. Thus, when it comes to recognizing a face, the *innate capacity* of *face recognition* would seem to play the same role that the *gestalt laws* play for the recognition of the triangle. Which means that Descartes' reasoning is fully in line with current scientific findings. Moreover, the example of the roughly drawn but nevertheless recognizable face – for instance, in the caricature of a well-known politician – highlights the *visual capacity* of recognizing the *essential traits* of a face even in these simplifying, *schematic, monogram-like* forms. This also holds, of course, for simple, schematic drawings of animals, houses, any object at all. Here we are already faced with a fact that in the course of our argumentation will become central and crucial, namely that even at the *pre-conceptual*, visual level no language is needed for us to be able to represent and recognize the *essential, universal* traits of a gestalt (such as the face in the above example)!

Thus, just as *innate gestalt laws* form the perfect circle of perception, and *innate grammar* syntactically structures our meaningful sentences, the innate faculty of apprehending the *simple natures* enables us to grasp the simplest relations and connections. And if we consider Descartes' scattered and seemingly hard-to-understand reflections in the light of this logic, they at once become easily understandable and cogent: as human beings, we are *naturally* endowed with the *natural light* that dispositionally enables us to grasp simple logical connections with necessity and universality. These become concrete, then, by our step-by-step and "click-by-

[749] René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 262.

click" apprehension of the *simple natures in* the objects and by applying, in this very act, our perfect innate logical "categories" to the always deficient, or never perfect, appearances of the real world. Our real-world perception takes in a random circular arrangement of points, but the function of the gestalt laws makes us see a complete circle and, guided by the *simple natures* and extrapolating from the imagined complete circle, makes us think it as the perfect Euclidean circle right down to its geometrical definition, which represents the function of the circle in its purest form. This does make sense, after all. What remains, then, is a last question, namely, whether this *definition* or *idea* of the circle exists atemporally in and for itself in a realm of ideas or whether it is simply a product of our mind that necessarily manifests itself.

In his analysis of the above-quoted passage from Descartes' *Meditations*, Dominik Perler also deals with the question, or problem, of acquired and innate ideas in Descartes or, in other words, with the relation of essential, atemporal, innate ideas that can be retrieved when adequately "triggered." In this, he follows the distinction made by Descartes himself, namely "*1. adventitious ideas, 2. ideas invented by me and 3. innate ideas*." He writes:

"*The famous trichotomy of course also suggests a distinction to be made between three kinds of objects: 1) material objects for adventitious ideas, (2) fictional objects for ideas invented by ourselves and (3) eternally and immutably existing objects for innate ideas. This classification is correct and harmless as long as it is not conceived of as a classification of three kinds of entities (i.e. three kinds of different things with different modes of existence). Various authors, however, have understood the classification to mean just that, claiming that Descartes had introduced abstract entities, or Meinongian objects, along with material and mental (fictional) objects.*[750] *Such a claim seems to me to be not only an inadequate interpretation of the objects of innate ideas; these objects are (…) nothing but concepts with a mental existence. But the claim that Descartes had introduced Meinongian objects seems to me to arise from a fundamental misapprehension of the rationalist approach*."[751]

Rather, and just as in Plato, the epistemic function of innate ideas is based on the fundamental insight that without the rational forms of the mind, the respective external objects would not be recognizable at all. Perler goes on to say:

"*By introducing innate ideas, Descartes does not intend to introduce a special class of entities. Rather, he wants us to be aware of the conditions for objects – also and especially material objects – to be represented at all. For we would not be able to represent*

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750 Here, Perler quotes: Anthony Kenny, Descartes. A Study of his Philosophy, New York, Random House 1968; Edwin M. Curley, Descartes Arguments Against the Skeptics, Cambridge, Harvard University Press 1978.

751 Dominik Perler, Repräsentation bei Descartes, Frankfurt / Main 1996, p. 220.

*material objects if we lacked the concepts we apply to the sensory perceptions*." (loc. cit.)

Drawing on various lines of argument in Plato and Descartes, we have already tried to show that there can be no perfect, flawless objects or figures in the real world and that the perfect idea actually is something that our innate mental structure or mind constructs in terms of perfect thoughts, models, or concepts. Thus, what is ultimately *innate* is the *dispositional* but *directional capacity* to think, of necessity, the perfect circle, not unlike the workings of the gestalt laws on the unconscious level that "compel" us to "see" a circle where there are some circular points only, but help us to complete the incomplete circle in our perception by imposing their *order* on the chaos of the field of vision and, thus, *organize* it. Since these functions or forms are not of an arbitrary, facultative and ever-changing nature but will *always*, within a regularly predefined and predictable if very simple framework, lead to the idea and, then, the understanding of the circle whenever we are faced with a more or less circular form, the logical consequence is that the concept of the circle is *innate*; which does not mean that we are born with the concept "circle" on our lips but that this concept is formed in the way just described every time some stimuli from the outside world triggers the formation of the respective thoughts.

This logic is emphasized by the metaphor, occasionally used by Descartes, of the "*seeds of reason*" that are sowed in the mind. For a grain of wheat – if we think along the line of this metaphor – will never grow into rye but always into a specific and *genetically preprogrammed* kind of wheat. Of course, the grain will not sprout under random environmental conditions but only when humidity comes into play, but it will always, *dispositionally*, be wheat and nothing else since this is what it is genetically preprogrammed to be. Now, since this capacity to grasp the *simple natures* is obviously innate to all normally developed humans, we are justified in saying that in this sense, the idea of the circle "*exists*" universally, that wherever human beings live and act, it will be thought and projected when circular objects are perceived. Thus, the idea of the circle "exists" *dispositionally* in our laws of gestalt and our *simple natures* but – in contrast to what *analytic philosophy*, that is, Frege and Russell and, ultimately, Popper used to believe – not in isolation in a "*third realm*" or "*third world*" of objects that exist in and for themselves in an absolutized form. From a perspective of philosophical history, it surely is an exquisite irony that the very fathers of analytic philosophy who never made a secret of their contempt of idealism and rationalism believed in a "realm" of Platonic ideas that were supposed to exist *in and for themselves* somehow in the universe!

As a conclusion, I would like to quote S.V. Keeling's remarkable interpretation of Descartes' understanding of innateness because in contrast to the usual destructive approach, he actually attempts to describe it in a way not unlike the one discussed above:

"*The peculiar difficulty and element of novelty Descartes's theory of innateness does introduce arises not from postulating a 'tendency' that is innate, but from postulating a special class of ideas (in the sense of 'objects of thought', 'thinkable items' or pure concepts) which it is the proper business of this capacity to originate and reinstate in mind from time to time. We should indeed be quite clear that to originate just those pure concepts which are ideas of simple natures and ideas deducible from them is precisely the peculiar property which differentiates Cartesian intuition from other mental dispositions that are likewise innate.*"[752]

Thus Keeling emphasizes the novel, original meaning of the Cartesian concept of innateness, which is not about a vague disposition to somehow act reasonably or, inversely, rely on objectively existing fixed ideas or forms; it is about a structured class of thoughts in terms of *simple natures* that, due to their *absolute simplicity*, and in part also due to their intuitive nature, are revealed to the "*eyes of the mind*" provided we can grasp them *clearly* and *distinctly* (*adequately differentiated*) and "*all at once*."

"*The capacity of pure thought is innate then, not only in the sense that any other radical mental function is, but in the further sense that when certain stages of mental development have been passed through it produces of itself the ideas directly contemplated throughout the passage of judgment and inference. Now such an originative, creative disposition cannot be wholly structureless or indeterminate. The clear and distinct ideas that it produces, however general, are always determinate, hence the capacity (or set of capacities) to produce them must be determinate too. It is a capacity which presents to, and so proposes for, contemplation, a pure concept (i.e. the idea of some simple nature) or an 'eternal truth' (i.e. a primitive principle or axiom) that is 'necessary' and so not certifiable by sense alone.*" (loc. cit., p. 170)

And Keeling further concludes that this "*originative, creative disposition cannot be wholly structureless or indeterminate*" and that the "*clear and distinct ideas that it produces*" are always *determinate* and *necessary*. This, one feels, is only one step away, if still a significant one, from Immanuel Kant's concepts of the understanding, its functions and rules.

"*So underlying his conception of such an innate psychical disposition is the hypothesis that selves or minds have in common a certain definitive constitution, and that, since they are essentially active, this constitution determines the character of the objective content or ideas contemplated, so far as that content is made up of ideas of simple natures. Thus innateness ascribed to pure concepts … has two important significations. Negatively, it indicates that the direct object of contemplation is not reached abstractively from sense-experience, but is generated or supplied by pure thought itself. Positively, it*

[752] S.V. Keeling, Descartes, Oxford University Press, London 1934, p. 169.

*indicates that the direct object of contemplation so generated discloses … something of the real character and structure of the universe transcending it.*" (loc. cit., p. 171)

This means that insofar as the nativist conception has to be accepted not only for the *simple natures* thus grasped but also for the innate "*functions of thinking*," this also ensures our transcendental access to the "*structure of the universe*." From all these considerations, it would seem to follow rather clearly that the ideas that are generated and grasped by the mind are to be conceived of as the work of the innate *functions of thinking* rather than autonomous objects of a "*realm of ideas*" or "*third world.*"

In this sense, the thinkers of *rationalism* have always argued that the perfect *gestalts* and *forms* exist "*in the soul*," as I have already shown with respect to Descartes as well as Plato's Seventh Letter. As for Kant, the categories are, in any case, clearly defined as *our* "*functions of thinking*":

Descartes:
"*For although the world could undoubtedly contain figures such as those the geometers study, I nonetheless maintain that there are no such figures in our environment except perhaps ones so small that they cannot in any way impinge on our senses. Geometrical figures are composed for the most part of straight lines; yet no part of a line that was really straight could ever affect our senses, since when we examine through a magnifying glass those lines which appear most straight we find they are quite irregular and always form wavy curves*."[753]

Plato:
"*A circle is a thing spoken of, and its name is that very word which we have just uttered. The second thing belonging to it is its definition, made up of names and verbal forms. For that which has the name 'round,' 'annular,' or, 'circle,' might be defined as that which has the distance from its circumference to its centre everywhere equal. … Under this head we must group everything which has its existence, not in words nor in bodily shapes, but in souls – from which it is clear that it is something different from the nature of the circle itself and from the three things mentioned before*."[754]

And it is in this sense, and in this sense only, that the *idea of the circle* can be said to be *innate*, namely as a directional capacity that exists "*in our soul*" and enables us to perceive, think, and define this perfect figure. Moreover, Plato emphasizes that "*[u]nder this head we must group everything which has its existence, not in words nor in bodily shapes, but in souls*," which further corroborates my interpretation and suggests that this class of forms "*has its existence, not in words nor in bodily shapes, but in souls*"!

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753 René Descartes, Meditations on First Philosophy, Author's Replies to the Fifth Set of Objections, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 262.

754 Plato, The Seventh Letter By Plato, Written 360 B.C.E., Translated by J. Harward (accessed at: http://classics.mit.edu/Plato/seventh_letter.html).

From this logical sequence, a last open question arises that is arguably also the one most difficult to answer, namely *how* the perfect Euclidean forms are supposed to have imprinted themselves on the soul, or to have developed in the mind in the course of evolution so as to have become innate; in other words: why it is just these forms that have become innate rather than the vague forms of some wild bushes, herbs or animals, which from an evolutionary perspective would seem to be much more likely and natural. There is no easy answer to this question, but I will try to offer a plausible, if speculative, one that for Plato and Descartes was still beyond the horizon. Due to the law of gravity and other physical laws in the universe, bodies and matters tend to form in accord with certain *invariable* and *constant* basic patterns which even biology, notwithstanding all its "creativity" and "learning capacity," cannot override. As a result, the celestial bodies that are closest to us – such as the moon and the planets – are more or less clearly structured and formed as spheres, the drop of water that hits the surface of a lake creates a circle, bubbles form spheres, etc. Furthermore, there are a number of natural biological bodies and organs that are clearly round or spherical: eyes, flowers, egg yolks, the section of a blood vessel, fruits, etc. Also, if you rotate an object with your hands, e.g. when throwing a pot on the wheel, it necessarily moves in a circle, just as the radius of an arrow shot behaves, or an object swinging at the end of a rope. Now, using magnetic resonance scans of the brain, it could recently be shown that *round forms* are experienced as particularly pleasant. Another explanatory pattern is offered by the gestalt laws. If due to basic laws, the given chaos of sense impressions will always be interpreted as and reduced to the "*good*" or "*simplest form*" by our perceptual system – e.g., the law of *closure* acting on open forms -, then it logically follows that the constant application of these principles will over time result in an *ideal form*. Lines will become even *straighter*, circles even *rounder*, angles even *righter*. Thus, it stands to reason that *round forms* or figures with *straight* lines have "imprinted" themselves on the brain as the preferred forms; which is why, in perception, there may have developed a preference for Euclidean forms.

It is hard to say, or prove, how the thinking of the perfect circle is supposed to have developed from this, but it is at least not unreasonable to suggest that as soon as we deal with round forms, the *simple natures* will make us realize, click by click, that there is a center, a radius, a diameter, that the object will roll, and so on. With respect to the triangle and the square, it may again have been certain gestalt laws that contributed, over time, to making these forms permanent. Carrying something, we would have realized that the shortest route between two milestones (in the plane) is a straight one; as a result, the shortest distance between two points would, then, always be a straight line also in our imagination. In a

situation where three points were marked and where the *laws of gestalt* would prompt us to *close* the area marked by the three points in terms of a *good* or *simple form*, the result would be a triangle. Following this logic, the assumption of a "*third world*" as suggested by Popper, or an abstract realm of eternal ideas as imagined by Frege and Russell, can be avoided without having, in turn, to resort to a mythical, religious, or fundamentalist "realm of ideas." Rather, it is the *evolutionarily* developed tendencies of the innate *gestalt laws* that have anchored the *ideal Euclidean forms* in *visual thinking* and helped the understanding to further exploit them by thinking.

In his later writings, for instance his 1644 "Principles of Philosophy" and the "Comments on a Certain Broadsheet published in Belgium towards the end of 1647" ("Comments"), but also in the "Conversation with Burman" and in his letters Descartes, sometimes using metaphors taken from nature, concretely refers to *innate capacities* or *dispositions*, which is largely consistent with the basic ideas of current nativism. In terms of the theory of evolution, which in Descartes' time was obviously still out of reach, it is quite plausible to assume that in the course of human evolution, many cognitive patterns may have been genetically put to the test and become fixated. So let's now examine some essential passages where Descartes refers to innate capacities, some of which, it should be noted, have given rise to misunderstandings, first of all the passage where Descartes states that all ideas are innate.

For instance, in a letter dated July 22, 1641 to his friend Mersenne, he seeks to clarify his view of innate ideas:

"*I do not understand your question whether our ideas are expressed by a simple term. Words are human inventions, so one can always use one or several to express the same thing. But I explained in my Reply to the First Objections how a triangle inscribed in a square can be taken as a single idea or as several. Altogether, I think that all those which involve no affirmation or negation are innate in us; for the sense-organs do not bring us anything which is like the idea which arises in us on the occasion of their stimulus, and so this idea must have been in us before*."[755]

Here, the argumentation is in line with Plato: in their perfect form, such ideas or thoughts as are logically deducible and cannot originate from sensory perceptions – which is perfectly demonstrable in the prime field of geometry – must have been "*in us before*" and are triggered "*on the occasion of a stimulus*." And another important point: "*Words are human inventions, so one can always use one or several to express the same thing*;" which suggests that for Descartes, form and thought take precedence over words which, then, only serve to express them.

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[755] René Descartes, Letter to Mersenne, 22 July 1641, in René Descartes, The Philosophical Writings of Descartes, Vol. III, Translated by John Cottingham, Cambridge University Press 1991, p. 187.

But the question implies another, and deeper, problem, namely whether Descartes refers to capacities or dispositions in general, since the latter could also manifest themselves in random, chaotic, or situationally inadequate ways rather than necessarily lead to the ideal form. Take a leg, for example: we know that for anatomical and physiological reasons, it can always only move in a certain way, but the concrete steps it will perform and the direction these steps will take cannot be deduced from this general capacity. When Descartes summarily states that the figures of the triangle or the circle, for instance, are innate this may indeed be disconcerting unless we are familiar with the previously outlined argumentation and the fact that when we see three points, the laws of gestalt will automatically make us form a closed triangle in terms of *Euclidean geometry* and that the *simple natures* will *with universality and necessity* make us grasp the further internal relations and characteristics (centroid, circumference, etc.) of this triangle. In Descartes' "*Comments on a Certain Broadsheet*" the question of innate ideas or, rather, *innate* knowledge is, then, brought to culmination. Here, finding himself compelled to defend his ideas, Descartes engages in a highly polemical dispute with his former disciple Regius whose anonymous pamphlet had the potential of compromising his position by accusing him of heresy. Besides other points of dispute, some of them of a theological nature, Descartes repudiates Regius' claim that what the mind needs, rather than innate ideas, is just the capacity of thinking so as to be able to generate insights from sense data. Now, since this runs counter to Descartes' views in two respects, he insists that, firstly, he indeed assumes that there are innate capacities that generate these ideas and that, secondly, thinking must indeed have this innate knowledge since it can never have abstracted it from sensory perceptions:

"*In article twelve the author's disagreement with me seems to be merely verbal. When he says that the mind has no need of ideas, or notions, or axiom this are innate, while admitting that the mind has the power of thinking (presumably natural or innate), he is plainly saying the same thing as I, though verbally denying it. I have never written or taken the view that the mind requires ideas which are something distinct from its own faculty of thinking. I did, however, observe that there were certain thoughts within me which neither came to me from external objects nor were determined by my will, but which came solely from the power of thinking within me; so I applied the term 'innate' to the ideas or notions which are the forms of these thoughts in order to distinguish them from others, which I called 'adventitious' or 'made up'. This is the same sense as that in which we say that generosity is 'innate' in certain families, or that certain diseases such as gout or stones are innate in others: it is not so much that the babies of such families suffer from these diseases in their mother's womb, but simply that they are born with a certain 'faculty' or tendency to contract them.*"[756]

[756] René Descartes, Comments on a Certain Broadsheet, in René Descartes, The Philosophical Writings of Descartes, Vol. III, Translated by John Cottingham, Cambridge University Press 1991, p. 303f.

So far, this argumentation is consistent with all of Descartes' previously quoted statements. The insight, fundamental to *rationalism* from Plato onwards, that the basic patterns of cognition cannot originate and be copied from sensory perceptions alone but that problem solving obviously requires us to actively as well as necessarily and repeatably invoke these patterns inevitably leads to the conclusion that these gestalts, forms and concepts, this *knowledge*, can only come from within ourselves. Since these potential capacities are – in Descartes' terms – "equally distributed" in all normal human beings, this warrants the further conclusion that both are innate. Descartes then further clarifies his position by explicitly and literally speaking of *dispositions* and *faculties* which, though inactive at birth, exist *latently* and manifest themselves later in the *way* a hereditary disease does, i.e. just as gout may run in certain families, but not metabolic disorders or cancer. And he chooses a very adequate example to illustrate these latent capacities, namely a *genetically innate* disease, that is, something with a *natural* cause, not God. He then discusses Regius' claim that all we need is the "*faculty of thinking,*" which implicitly presupposes the assumption that human beings are able to accumulate knowledge in small, imperceptible steps from "experience" and that, therefore, all universal concepts are derived from observation. But since the way this is expressed by Descartes is somewhat misleading, it has time and again given rise to claims that he had assumed *all* ideas to be innate:

"*But this is so far from being true that, on the contrary, if we bear well in mind the scope of our senses and what it is exactly that reaches our faculty of thinking by way of them, we must admit that in no case are the ideas presented to us by the senses just as we form them in our thinking. So much so that there is nothing in our ideas which is not innate to the mind or the faculty of thinking, with the sole exception of those circumstances which relate to experience, …*" (loc. cit., p. 304)

Clearly, Descartes' intention here is to highlight the fact that things are not directly *copied* into our consciousness but that every object and every "*idea presented to us by the senses*" must be formed and interpreted by the *innate* ideas (which, in Kant, would be the categories) in a way that enables us to understand and even conceptually grasp their function. On the whole, this is consistent with Kant's doctrine that it is the categories of the understanding which, by organizing the sensory data by way of the intuition, impose their order on the things and, ultimately, conceptualize them. Broadly speaking, this means that every representation includes an *element of structuring innate thinking*. As a consequence, *all* objects are also "thought" by means of the a priori existing functions of the categories. This is precisely what Descartes aims to say at this point, as well as a way of conceiving of cognition that reveals him as a direct precursor of Kant, something the Marburg School of *Neo-Kantianism* has always sought to keep in evidence. In this sense, any representation, or idea (in

Descartes' terminology), is co-formed by the innate structures of the mind, just as *any sentence* is co-formed by *universal grammar*. Without the latter, it would be nothing but a syntactically incoherent mouthing of phonetic syllables. This becomes even clearer when Descartes discusses our "*faculty of thinking*," at least for those who seek to understand what he wants to say and are not bent on finding, by hook or by crook, a starting point for linguistic-analytic special treatment:

"*… with the sole exception of those circumstances which relate to experience, such as the fact that we judge that this or that idea which we now have immediately before our mind refers to a certain thing situated outside us. We make such a judgement not because these things transmit the ideas to our mind through the sense organs except certain corporeal motions, …*"[757]

Thus, Descartes follows through with his argumentation, insisting that these are innate capacities that are activated on the occasion of sensory perceptions ("*not because these things transmit the ideas to our mind through the sense organs*") and form our insight on the basis of the structures which in their *pure form* can never be provided by the senses because the latter can only transmit certain "*motions*" (that is, stimulations by light waves and corpuscles, biochemical transformation performed by the receptors, etc.); which motions, however, do not produce insights by themselves but only become insights as a result of the processing done by the innate capacities! Here, Descartes again refers to "*a certain thing situated outside us*" rather than an idealist nirvana. He concludes by once more rounding out his argumentation:

"*It is surely obvious to everyone that, strictly speaking, sight in itself presents nothing but pictures, and hearing nothing but utterances and sounds. So everything over and above these utterances and pictures which we think of as being signified by them is represented to us by means of ideas which come to us from no other source than our own faculty of thinking. Consequently these ideas, along with that faculty, are innate in us, i.e. they always exist within us potentially, since the term 'faculty' denotes nothing but a potentiality.*"[758]

Thus, Descartes again insists that "*they always exist within us potentially*." By no stretch of the imagination can I see anything in Descartes' statements beyond his arguing for a potential innate faculty to activate, on the occasion of stimuli from the sensory organs or the inner sense, the latent mental faculties that structure the bundle of sensory perceptions from the

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[757] René Descartes, Comments on a Certain Broadsheet, in René Descartes, The Philosophical Writings of Descartes, Vol. III, Translated by John Cottingham, Cambridge University Press 1991, p. 304.

[758] René Descartes, Comments on a Certain Broadsheet, in René Descartes, The Philosophical Writings of Descartes, Vol. III, Translated by John Cottingham, Cambridge University Press 1991, p. 305.

outside world according to certain patterns that exist a priori – or, as we know today, are genetically predefined – in a way that allows us to reasonably organize, process and, ultimately, understand it in terms of conceptual thinking. So, what Descartes means by saying that all ideas are innate is that since *all* sensory perceptions of things are of necessity structured by our understanding, any idea that exists in our consciousness is necessarily subject to this formation by the innate understanding and, therefore, has to be counted among what is "innate." The crucial further step, not done by Descartes, will later be provided by Kant, namely by his deduction of the "*functions of thinking*" from thinking itself. Descartes' doctrine, as I see it, is definitely more plausible that Frege's and Russell's "realm of ideas," and clearly anticipatory of Kant. Or, in Deborah Boyle's summary of Descartes' reasoning:

"*The intellect is equipped with innate ideas, natures existing objectively in the intellect, which we have the capacity to perceive; reflection is the way that this capacity gets actualized.*"[759]

The entire argumentation, or "attack," launched by Locke in the Book I of his Essay is thus invalidated, notwithstanding the fact that even in the 20th century it has been celebrated as a grandiose achievement that does him nothing but honor (see Wolfgang Stegmüller's previously quoted comments).[760] So, let's once more briefly recapitulate what is the meaning of *innate faculties* and *ideas* in Descartes and how his epistemology remains consistent from the *Regulae* through to the late works: human beings are *naturally* endowed with the *natural light* – pure reason – which, relying on an *innate structure*, *dispositionally* (potentially) allows us to grasp *simple natures* by *intuitive evidence*; and the resulting insight is certified as correct by its *clear* and *distinct* (adequately differentiated) nature and the fact that it is there "*all at once*." These simple steps of insight are, then, connected by *deduction* to form logically ordered *chains*, or webs of chains, that provide logical coherence to our knowledge. On the occasion of a "*stimulus*" from sensory perception, our *latently innate capacities*, always *potentially* in readiness, are activated so as to provide the patterns

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759 Deborah A. Boyle, Descartes on Innate Ideas, Continuum International Publishing Group, London/New York 2009, p. 60f.

760 Hartmut Brands even sees Locke's entire Essay as opposed to the concept of innate ideas: Hartmut Brands, Untersuchungen zur Lehre von den angeborenen Ideen, Meisenheim/Glan 1977, p. 51. From a history-of-philosophy point of view, this book is an interesting read since in the conclusion, probably written at the height of its hubris, Brands recommends "withdrawing [Chomsky's theses] from circulation." Here, however, the EAN "inquisition" failed to deliver, Chomsky's books have not only not been "committed to the flames" but are among the most frequently cited works of our time, which is presumably more than can be said of Mr. Brands' writings.

that serve to *organize* the sensations – that have been processed (according to the *laws of gestalt theory*, as we would say today) to form images and "*good forms*" – into *relations* which, in turn, provide the basis for further judgments and conclusions. *Innate ideas* in Descartes are ideas that do not come "from the outside" but invariably originate, directionally, from the innate structures, as we have repeatedly described. But they are *not innate in terms of fixed ideas or concepts*. All the way through to his late works, Descartes' overall position remains very plausible as well as consistent with his *Regulae* and certain observations in his letters. Moreover, it is strongly suggestive of Kant's epistemology, the only exception being his explicit use of the term *innate faculties* rather than *a priori faculties* and *functions of thinking*, and completely in accord with the modern scientific theory of perception as well as with nativism. Taking account of this obvious congruence with Kant, Paul Natorp states:

"*The original function of insight, which ultimately defines its validity and its limits, is thus conceived of by Descartes in complete accord with Kant, as a priori synthesis that alone justifies all those initial judgements that are the fundament on which all true knowledge ultimately builds*."[761]

But before going on, I propose to explore Kant's own position on this issue because it has repeatedly been claimed that he had explicitly argued against the idea of innate concepts, or innate knowledge. In my view, however, most commentators have simply shied away from taking a clear stand on this issue, with some of them even deliberately ignoring the respective references or using incomplete quotations. Any unbiased and open-minded effort to understand what Kant really, if reluctantly, means will find that although he never says so clearly and explicitly, there is an ongoing assumption of innate faculties, powers, implanted principles, etc.

## The concept of "innate" in the philosophy of Immanuel Kant

We are now entering a most interesting field, for there is hardly any other topic in Kant where the secondary literature has been so unanimous in affirming that he had unambiguously argued against innate ideas and concepts. In most cases, this conclusion draws on the same two passages from Kant, and the case is represented as definitely settled and no longer worth discussing. Kant, it is true, never wrote anything as definite as: "The categories of the understanding are innate," "The intuition of space and time is innate," or "This concept is innate," nor anything in the way of Leibniz' or Descartes' unambiguous statements in this respect. Never-

[761] Paul Natorp, Descartes' Erkenntnistheorie, Eine Studie zur Vorgeschichte des Kri-ticismus, Marburg 1882, p. 19.

theless, as I propose to show in the following, a careful reading of and unbiased approach to his writings will come upon many a suggestion and reflection that strongly points in this direction. On the other hand, considering that Kant's writings on anthropology and natural philosophy reveal him as firmly grounded in the natural sciences, he shows remarkable restraint when it comes to the issue of the origin and innateness of our faculties, powers, and functions. Even Hermann Cohen couldn't help noting that the relation between *a priori* and *innate* had never been conclusively clarified:

"*Are space and time innate according to Kant? That previous reflections have failed to come up with an explicit answer to this question must be considered a new gap for transcendental logic to close (…) For the entire history of the a priori is informed by its complication with innateness*."[762]

In this context, Cohen naturally refers to Plato and to Descartes' *lumen naturale* but also to the function of the a priori in Kant's philosophy itself, as well as to his 19th-century commentators:

"*Understandably, therefore, almost all authors refer to the 'pure intuition of space and time innate to us.'*"[763]

So it seems that the matter is still not finally settled. Rudolf Eisler's famous *Kant-Lexikon* notes:

"*The a priori is not to be understood as something innate. The concepts of the understanding 'are … to be sought … in the very nature of the pure understanding, and that not as connate concepts but as concepts abstracted from the laws inherent in the mind (by attending to its actions on the occasion of an experience), and therefore as* acquired *concepts.'*"[764]

Now, at first glance, this seems to suggest that the "*a priori is not to be understood as something innate*" and that the concepts of the understanding (the categories) are, therefore, not innate, either. But at the same time, the very same sentence explicitly states that they "*are … to be sought … in the very nature of the pure understanding,*" whatever this is supposed to mean, and that we are endowed with *"laws inherent in the mind."* So, this is far from being an unambiguous statement, and in his *Anthropology*, which is a late work, Kant refers, for instance, to "*animals*" that "*can*

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762 Hermann Cohen, Kants Theorie der Erfahrung, Berlin 1885, p. 195.

763 Hermann Cohen, Kants Theorie der Erfahrung, Berlin 1885, p. 214, quotation from Jürgen Bona Meyer, Kants Psychologie. Dargestellt und erörtert von Jürgen Bona Meyer, Berlin 1870, p. 131.

764 Rudolf Eisler, Kant Lexikon, Hildesheim 2008 (1930), p.13; quotation from Immanuel Kant, Inaugural Dissertation of 1770, in Immanuel Kant, Theoretical Philosophy 1755–1770, Cambridge University Press 1992, p. 387f.

*manage provisionally, following implanted instincts.*"[765] Thus, in his very own terminology, "*implanted*" clearly signifies "*innate*." Wordings of the same tenor are repeatedly found, primarily when Kant focuses on other contexts, for instance, when defining the aim of his studies in his *Transcendental Analytic*:

"*We will therefore pursue the pure concepts into their first* seeds *and* predispositions *in the human understanding, where they* lie ready, *until with the opportunity of experience they are finally developed …*"[766] (my emphasis)

How can both of these be true? For if our judgments and conclusions are based on the *pure concepts of the understanding*, the functions of the faculty of a priori understanding – and here, Kant is one-hundred percent firm in his stand against empiricism and, therefore, speaks of concepts of the understanding and of "*the laws* [that are] *inherent in the mind*" and must be sought "*in the very nature of the pure understanding,*" the "*first seeds and predispositions in the human understanding, where they lie ready*" – how, then, can these "*predispositions*" that "*lie ready*" "*in the human understanding*" be, at the same time, not innate? Kant uses biologistic terminology that clearly refers to *nature* (rather than God) and is consistent, within what could be said in the 17th and 18th centuries, with Descartes' "*natural light*" and "*seeds of reason.*" Also, both Kant's metaphor of the "*seeds and predispositions in the human understanding*" and Descartes' "*seeds of reason*" emphasize the *dispositional* element. For, as discussed above, all these perfectly defined "seeds" lie ready in the ground and will develop "*with the opportunity of experience*;" and seeds do have the peculiarity that they can always only develop in accord with their *nature*. That is, we are equipped with functions of the understanding that are implanted by *nature* and work in a uniform way, generating conclusions and judgments with necessity and universality; from which it logically follows that we need to "*pursue*" these laws in the *nature* of the pure understanding.

For what else could it possibly mean but that these very functions of the understanding, the concepts of the understanding, are "*implanted in us*" and for this very reason must be *universally valid*? How are the *concepts of the understanding* supposed to fulfill their function with *necessity* and *universality* if they are not dispositionally and uniformly implanted in man? Which raises the question why Neo-Kantianism tends to shy away from explicitly pursuing this lead and figuring out in detail how Kant really conceives of *structures that are implanted by nature, on the one hand, but not innate, on the other*. An explanation in terms of philosophical his-

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765 Immanuel Kant, Anthropology, History, and Education, Cambridge University Press 2007, p. 304 (BA 115).

766 Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 203 (B 91).

tory could be the strong EAN aversion against nativism, an attitude we will later discuss in some detail with respect to Alois Riehl. But let's first take a closer look at the second part of Kant's statement, namely that the concepts of the understanding are themselves abstracted in the process of being activated and, as a consequence, can only be *acquired*. This, however, is not inconsistent at all with the innateness of the pure concepts of the understanding as *functions*, for when we assume that we have a *universal grammar*, for instance, it is not the *concept* of "*universal grammar*" that is innate, it is not the concept that children are supposed to get born with and pronounce. Rather, what we have at birth – and what could be established by many years of creative and systematic research – is this innate grammatical *structure* as a *disposition*. So, what is *innate*, rather than the concept of "*universal grammar*" as set forth by Noam Chomsky or any concrete concepts, is the mental structure in line with the universal grammar. Anything else would really be the roast pigeons of lotusland, a true *"philosophy of the lazy.* (Kant)" What remains, therefore, is the question of how to give a concrete and reasoned explanation of "*the apriori*" in Kant and how to interpret its position if it is supposed to be something like the "first seeds" implanted by nature, on the one hand, but not *innate*, on the other.

In his inaugural dissertation of 1770 "De Mundi sensibilis atque intelligibilis forma et principiis," Kant already offers some interesting observations regarding the issue of innate concepts. In § 8, he insists that the principles of thinking are to be sought

"*… in the very nature of the pure understanding, and that not as innate concepts but as concepts abstracted from the laws inherent in the mind (by attending to its actions on the occasion of an experience), and therefore as acquired concepts. To this genus belong possibility, existence, necessity, substance, cause etc., together with their opposites or correlates*."

This is a very helpful observation, and very much to the point. The principles, or a priori structures and functions of thinking, are to be found in the "*nature of the pure understanding*," which implies that while thinking has a determinate "*nature*," any concepts such as existence or necessity are not innate. They are, however, *abstracted* from the "*laws inherent in the mind*"! This suggests that concepts are not innate – here Plato and Descartes would at once agree – but are generated by "*laws inherent in the mind*" (i.e. in a law-based manner) and can be found in the "*nature of the pure understanding,*" to which Plato and Descartes, as well as my humble self, would again agree! Kant then also addresses the issue of spatial perception, where his argumentation is basically consistent with the position set forth in his *Transcendental Aesthetic* in the *Critique of Pure Reason*:

"*For things cannot appear to the senses under any aspect at all except by the mediation of the power of the mind which co-ordinates all sensations according to a law which is stable and which is inherent in the nature of the mind*."[767]

What is remarkable here is Kant's use – in the German text – of the term "gestalt" (rendered as "aspect" in the English translation), on the one hand, and his reference to "*a law which is stable and which is inherent in the nature of the mind*," on the other, which is also strongly suggestive of the mode of gestalt laws. At any rate, Kant's view here clearly is that what is implanted ("eingepflanzt" in the German text, rendered as "*inherent*" in the English translation) is not just a potential, facultative capacity – in this case not yet of pure reason but at least of spatial perception – but a "*law which is stable*" and, even more important in the present context, "*which is inherent in the nature of the mind.*" If this is, word for word, how Kant chooses to express himself, there can be no doubt that he thinks that humans have implanted *functions* in terms of faculties that principally enable the mind, i.e. thinking, to organize natural appearances in an *rule-based*, if not *law-based*, manner, for there hardly is any other way to interpret a formulation such as "*inherent in the nature of the mind.*" What is more, Kant, in contrast to Descartes, refers to a "*law which is … inherent*," which is even more stringent and to the point than Descartes' *dispositional capacities* of the mind. According to Descartes, "insight" into the law-based connections and properties of the *simple natures* of things (or inherent in things) can, potentially and with adequate experience, be gained by way of the *natural light* and *intuitive evidence* while according to Kant, it is the *laws* (!) *… inherent in the nature of the mind* that of necessity organize the sensory perceptions and impose their order of perception on things before the "tribunal of reason"! This means that Kant's *apriorism* is by its very nature much more stringent and much more radical than that of Descartes, even though the latter is quite explicit in this respect while Kant notoriously seeks to elude any clear commitment as to the form in which these "*laws*" are "*inherent*" in us.

There are also other passages, for instance in Kant's answer to the 1791 Prize Essay question "What Real Progress Has Metaphysics Made in Germany since the Time of Leibniz and Wolff?", where he actually expresses himself quite clearly: "*… concepts that lie* a priori *in the understanding,…*" If this is true for all human beings, how can these concepts exist, in the first place, and how come they are so constant and universal in character? And: "*This temporal sequence is founded in the nature of*

[767] Immanuel Kant, Inaugural Dissertation of 1770, in Immanuel Kant, Theoretical Philosophy 1755–1770, Cambridge University Press 1992, p. 387f. and p. 398.

*man's cognitive capacity.*"[768] What can "*founded in the nature of man's cognitive capacity*" possibly mean, if not "innate"? And, finally:

"*The form of the object, as it can alone be represented in an intuition* a priori*, is therefore based, not upon the constitution of this object in itself, but on the natural constitution of the subject who is capable of an intuitive representation of the object; …*" (loc. cit.)

The "*natural constitution of the subject*" – ? These quotations from Kant's writings should suffice as evidence, at least for the time being, that in Kant's thinking crucial law-based functions of the mind are indeed conceived of as a *natural* fact, or as "implanted." But Kant refers to the origin of concepts also in his *Lectures on Metaphysics*:

"*But concepts have arisen through the understanding, according to its nature, on the occasion of experience; for on the occasion of experience and the senses the understanding forms concepts which are not from the senses but rather drawn from the reflection on the senses*."[769]

The concepts, of course, arise "*through the understanding*" and "*not from the senses*" but, it should be noted, "*according to its nature,*" i.e. the nature of the understanding, which at least does not preclude a dispositionally innate preformation of the formative *functions*. Kant goes on to say:

"*Locke was badly mistaken here in that he believed all his concepts to be drawn from experience; for he did draw them from the reflection which is applied to the object of the senses. Thus with respect to matter all arise from the senses; with respect to form from the understanding, but they are not inborn in the understanding, but rather come about through reflection on the occasion of experience.*" (loc. cit.)

This, then, clearly indicates that while Kant considers the *concepts* (!) themselves to be "*not inborn,*" this statement does not extend to the "functions of judgment;" which makes it clear that what Kant refers to as 'not inborn' is strictly *concepts*. This is not at all contrary to Descartes' doctrine, nor to modern nativism à la Chomsky, for the *functions* that generate the concept from the "matter" provided by the senses may well be innate and implanted by nature while their "product", the individual *concept*, is not.

Let's now turn to the first of Kant's much-referred-to observations on this issue, namely from his Inaugural Dissertation "*De mundi Sensibilis*," Corollary to §15, which reads, unabridged:

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768 Immanuel Kant, What Real Progress Has Metaphysics Made in Germany since the Time of Leibniz and Wolff?, in Immanuel Kant, Theoretical Philosophy after 1781, Cambridge University Press 2002, p. 356f.

769 Immanuel Kant, Lectures in Metaphysics, Cambridge University Press 1997, p. 52.

"*Finally, the question arises for everyone, as though of its own accord, whether each of the two concepts is innate or acquired. The latter view, indeed, already seems to have been refuted by what has been demonstrated. The former view, however, ought not to be that rashly admitted, for it paves the way for a philosophy of the lazy, a philosophy which, by appealing to a first cause, declares any further enquiry futile. But each of the concepts has, without any doubt, been acquired, not, indeed, by abstraction from the sensing of objects (for sensation gives the matter and not the form of human cognition), but from the very action of the mind, which coordinates what is sensed by it, doing so in accordance with permanent laws. Each of the concepts is like an immutable image, and, thus, each is to be cognised intuitively. For sensations, while exciting this action of the mind, do not enter into and become part of the intuition. Nor is there anything innate here except the law of the mind, according to which it joins together in a fixed manner the sense-impressions made by the presence of an object.*"[770]

Basically, this echoes our previous argumentation: the concepts themselves are not innate but arise from thinking. Also, and in contrast to the empiricist model, Kant emphasizes that the concepts cannot be abstracted from sensory perceptions; which again is fully consistent with Descartes. Kant then refers to "*the very action of the mind, which coordinates what is sensed by it, doing so in accordance with permanent laws*." If there is an "*action of the mind*" (the expression used by Kant in the German text is "*Erkenntniskraft*", i.e. "cognitive power," which is per se more biologistic) that operates in accord with permanent laws, and if these laws are valid and effective in all humans and universal by their very nature, then their existence can again be explained in no other way than by their being innate. How else to explain this *law-based* harmony? Kant then comes to his conclusion on the issue: "*Nor is there anything innate here except the law of the mind,...*" But this, if anything, is the point, of course, for what else can a "*law of the mind*" – which is a much stronger, much more compelling mode than Descartes' *potential capacity* – be if not *innate* since a law of the mind cannot originate from the senses, nor can it be constituted through learning, and is nevertheless "implanted" and the same in all humans? Thus, in Kant, there undeniably is the *literal* statement that at least a *law of the mind is innate*.

Kant's second much-quoted statement on innate concepts is from his polemical essay "On a Discovery, whereby Any New Critique of Pure Reason is to be Made Superfluous by an Older One" of 1790, which is his reply to *Johann August Eberhard's* objections to Kant's *Critique of Pure Reason*. A follower of the Wolff-Leibniz school of thought, Eberhard primarily brought into play certain parts of Leibniz' argumentation that were supposed to dispense with Kant's approach, first of all with respect

[770] Immanuel Kant, Inaugural Dissertation of 1770, in Immanuel Kant, Theoretical Philosophy 1755–1770, Cambridge University Press 1992, p. 400.

to epistemological issues. In the relevant passage, Kant famously also addresses the issue of innateness:

"*The Critique admits absolutely no implanted or innate representations. One and all, whether they belong to intuition or to concepts of the understanding, it considers them as acquired. But there is also an original acquisition (as the teachers of natural right call it), and thus of that which previously did not yet exist at all, and so did not belong to anything prior to this act. According to the Critique, these are, in the first place, the form of things in space and time, second, the synthetic unity of the manifold in concepts; for neither of these does our cognitive faculty get from objects as given therein in-themselves, rather it brings them about, a priori, out of itself. Here must indeed be a ground for it in the subject, however, which makes it possible that these representations can arise in this and no other manner, and be related to objects which are not yet given, and this ground at least is innate.*"[771]

A *superficial reading* of this passage might again suggest that there can be no doubt whatsoever that Kant explicitly and literally denies innate ideas. But basically, Kant's argumentation here does not differ from that in the previous example. For what does he actually say? The "Critique" (of Pure Reason) does not allow for implanted or innate ideas (representations). This makes sense, besides being fully consistent with everything Descartes had taught. Ideas, or concepts, such as "raspberry ice cream," "space" or "category" are not innate. But, then, Kant also refers to "*an original acquisition*" as he calls it to avoid using the term of "*innate*," namely, the "*form of things in space and time*" and the *function of synthesis*, the categories being subsumed, in this case, under the collective term of *synthesis*. And he has time and again insisted that the forms of space and time are not abstracted from the empirical world but are something the subject is originally endowed with, and that the categories are the "ground" that enables us to create unity in the manifold and *a priori* impose *laws* on objects. And "*this ground at least is innate*," as he states at the end of this passage.

Moreover, Kant says "*that these representations can arise in this and no other manner*," which is a very interesting statement considering my previous discussion of this issue in Descartes. For if there is an "*innate ground*" for ideas to "*arise in this and no other manner*," that is, if these ideas *must* arise in us, then the logical result is the very mode already specified by us: what must be innate are not the concepts themselves but the basic *functions* or, in Kantian terms, the *categories* that enable us to form universal und necessary concepts! Only innate laws, or innate structures, of the mind can ensure that the idea and the concept "*arise in this and no other manner*," and this is why 2 + 2 is always 4 and never 69, as speculatively proposed by W.D. Hart. Thus, all the parts eventually fit together:

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[771] Immanuel Kant, On a discovery whereby any new critique of pure reason is to be made superfluous by an older one (1790), in: Immanuel Kant, Theoretical Philosophy after 1781, Cambridge University Press 2002, p. 312.

there is no such thing as innate concepts, there is no dissent here. What is innate or, in Kant's somewhat veiled formulation, "*an original acquisition*" is the "*form of things in space and time*" as set forth in the Transcendental Aesthetic, and the categories (the concepts of the understanding) and, as a consequence, our understanding, or "*functions of thinking,*" as a whole. Geert Edel, too, notes that Kant found himself in a dilemma at this point, which he sought to escape by introducing the "*auxiliary construction*" of "*an original acquisition*" or the "disjunction of 'acquired-innate'":

"*One may or may not accept this auxiliary construction, but in substance it is clear that the categorial system as well as the initial-synthetic unity of apperception (along with space and time qua forms of the intuition) are part of the basic cognitive equipment of man, which must be identical in all empirical subjects notwithstanding their empirical-factual differences because otherwise, the claim to completeness raised by Kant for his system of categories would be futile. This is a rigid system and a closed system, and this fact alone implies that it cannot be complemented, modified, changed over time since time is nothing but a form of our intuition.*"[772]

In what follows, however, Edel goes along with Cohen in positing that the categories, too, are ultimately "products of thinking" and, thus, like all thinking, subject to change and progress over time. But the "*natural constitution of the subject,*" as I see it, cannot be dependent on the progress in time, nor can the "*predispositions*" that "*lie ready*" "*in the human understanding.*"

At any rate, we now have *two statements* by Kant where he literally and explicitly says that our *forms of space and time* as well as *the categories*, or the unity of synthesis, are innate. Does this statement differ in any way from Descartes' reasoning with respect to innate capacities that exist latently and potentially? Not in terms of the *fact* of being *innate*. They rather differ in their tactical operationalization: *simple natures*, *intuitive evidence*, *clarity* and *distinctness* in Descartes, and *intuitions* and *concepts*, organized in *space* and *time*, applied through the categories and a priori synthesis, unified *qua* schema, in Kant. Can we conclude from Kant's statements that he denies the innateness of the functions of thinking? No, we can't! There's no getting around the fact that Kant literally speaks of "*innate*," not "*a priori,*" so he was clearly aware of the facts even though he shied away from emphasizing them because for some reason or other they caused him discomfort. Incidentally, it should be noted that throughout the *Critique of Pure Reason*, Plato and even more so Descartes remain strangely "underappreciated" and that the dedication that precedes

[772] Geert Edel, Hypothesis: die Grundlegung ist die Grundlage – Hermann Cohens tiefste Einsicht, in: Christian Krijnen, Transzendentaler Idealismus und empirischer Realismus, in: Christian Krijnen, Kurt Walter Zeidler (eds.) Wissenschaftsphilosophie im Neukantianismus, Würzburg 2014, p. 70.

the text is to Baco de Verulam (Francis Bacon) rather than these founding fathers of rationalist philosophy. This fact has prompted some interesting observations by Cassirer and Paul Natorp, as well as an in-depth study by Hans-Peter Schütt. The latter literally speaks of Kant's "interpretive mistake" in this respect and more specifically refers to Kant's "refutation of idealism" in the *Critique of Pure Reason*:

"*By no stretch of the imagination can Kant's refutation of idealism be construed as a direct refutation of a position taken by Descartes. Since Kant cannot have been unaware of the fact I have in mind, the question of course arises of what may have been a plausible motive for him to nevertheless associate 'Cartesius' (as he called him) with his refutation of idealism*."[773]

Schütt further points out that Descartes' idealism is alluded to in the chapter "On the paralogisms of pure reason" that is part of the first edition (A 367, A 377) and that "Cartesius" is also the only "skeptical idealists" to be mentioned by name, a fact already remarked on by Paul Natorp.[774] In the end, Schütt cannot but note:

"*Anyone who has a more than superficial knowledge of Descartes' writings will find it difficult to associate the 'skeptical idealism' that is laid out for refutation in the fourth paralogism with something like 'Cartesian idealism,' as it is called in the Prolegomena (Prolegomena AA IV). For not only did Descartes not deny the 'existence of matter,' he also, unlike Kant's 'skeptical idealist', did not at all hold it to be 'unprovable' (CPR A 377). On the contrary, he sought to crown his Meditations with nothing less than a proof to this effect. Doxographically, therefore, Kant is wrong in describing the 'empirical idealism of Descartes' as 'a problem, whose insolubility left everyone free, in Descartes' opinion, to deny the existence of the corporeal world, since the problem could never be answered satisfactorily' (Prolegomena AA IV; CPR B274, AA III)*."[775]

Let's now come back to the famous passage in Kant's Inaugural Dissertation of 1770 where he refers to the "*causes contained in the nature of the subject*," i.e. causes that are *innate*, and confront it with a commentary by *Alois Riehl* that will allow me to ideal-typically demonstrate how the meaning of this passage was on occasion interpretively manipulated, and has ever since been shelved as anti-nativist. Since Riehl was a neo-Kantian with strong leanings towards empiricism, if not realism, and used to focus on Kant's relation to Hume in his reflections, he could not but see the

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773 Hans-Peter Schütt, Kant, Cartesius und der „sceptische Idealist," in: Andreas Kemmerling, Hans-Peter Schütt (ed.), Descartes nachgedacht, Frankfurt/M. 1996, p. 170f.

774 Paul Natorp, Descartes' Erkenntnistheorie, Eine Studie zur Vorgeschichte des Kri-ticismus, Marburg 1882, p. 169.

775 Hans-Peter Schütt, Kant, Cartesius und der „sceptische Idealist," in: Andreas Kemmerling, Hans-Peter Schütt (ed.), Descartes nachgedacht, Frankfurt/M. 1996, p. 176. See also: Hans-Peter Schütt, Die Adoption des ‚Vaters der modernen Philosophie', Frankfurt/M. 1998.

topic of "innateness" as an alien element that needed to be smoothly disposed of in the well-known empiricist manner. So, having discussed the two above-quoted passages in Kant, Riehl comes to the following conclusion:

"*A second consequential misunderstanding concerns the confusion between the apriori and the doctrine of innate concepts, this 'philosophy of the lazy.'*" Having, then, quoted the relevant passage from Kant's Inaugural Dissertation of 1770, he argues: "*The same holds for the concepts of the understanding. They are to be sought in the nature of the understanding rather than the senses, but should not be seen as innate; rather, they are to be conceived of as concepts that have been abstracted from the laws that are specific to the consciousness and are, therefore, acquired, namely through our reflecting, on the occasion of experience, on the activity of this consciousness. These concepts are therefore not innate to the consciousness either as ideas or dispositions or endowments. We acquire them by reflecting on the laws of the consciousness. They are concepts that originate from the reflection on the manifoldness of appearances and come to express the laws of this thinking consciousness. Thus, the category is generated by applying the logical functions of judgment to the appearances, and the logical functions themselves originate from the synthetic unity of the consciousness, a unity that is not given but produced*."

And Riehl concludes, emphasizing his point by an exclamation mark:

"*This goes to show how far Kant was from nativism, the philosophy of the lazy!*"

And in an effort to ward off any attempts to play down this position as something that only applies to Kant's early writings, he adds:

"*To make sure that the above passages are not taken as a manifestation of an earlier view no longer held by Kant in the Critique, let me just refer to a statement dating from the time when his critical philosophy had reached its most sophisticated form: 'The* Critique *admits absolutely no implanted or innate representations. One and all, whether they belong to intuition or to concepts of the understanding, it considers them as acquired*.'"[776]

And this is where we catch empiricism-leaning Riehl red-handed, for he "forgets" – consistently, if not *deliberately* – to quote the second part of this passage such as I have quoted it in the above, where Kant speaks of "*an original acquisition*" and says that "*this ground at least is innate.*" So, for the sake of completeness, let me requote:

[776] Alois Riehl, Der philosophische Kritizismus und seine Bedeutung für die positive Wissenschaft, Band 1, Geschichte und Methode des philosophischen Kritizismus, Reprint 2012 (1876), p. 100f.

"*Here must indeed be a ground for it in the subject, however, which makes it possible that these representations can arise in this and no other manner, and be related to objects which are not yet given, and this ground at least is innate*."[777]

Uncontrovertibly, Kant speaks of "*a ground*" in the subject, "*which makes it possible that these representations can arise in this and no other manner, and be related to objects which are not yet given, and this ground at least is innate*." There is no discrepancy whatsoever with Descartes' reasoning: what is innate is not the *concept* or the *idea per se* but the characteristic, or formative, mental structure that, however, will necessarily lead to the formation of this and no other idea, or concept; or, even more accurately and in terms of the *visual turn*: what is innate is at least the *understanding of function* with respect to a connection, which can – and, according to Kant, will – subsequently be expressed by the respective concept, or concepts. Interestingly, in Hans Vaihinger's comprehensive *Commentar*, this very line – "*…, and this ground at least is innate*" – is among the very few that are highlighted in bold!

But Kant's statement contains yet another idea which, though not explicitly formulated, is extremely important and crucial, since the relation between idea and concept and the real world is still unclear. For if the "*innate ground*" ensures that our representations and, as a consequence, also the objects can only appear to us in this way and no other while in this intuition, representation and concept, the world must have an unbroken continuity and cohesion, this also, if implicitly, means that this *innate element* that Kant definitely refers to is the *ground* of the stability and uniformity of the appearances. So, if there is this "*innate ground*" that makes us perceive the world in precisely the way that is ours, and in no other, and at the same time constitutes the world for us as an unbroken continuity of experience, then this *innate element* is, on the one hand, the *guarantor of the stability and uniformity of our world* and, *at the same time*, being *innate*, is given to us by *nature*, *as part of nature*, that is, the *real world*. And in the 21st century, given by nature can only mean one thing: by evolutionary *heredity*. In plain language, this means: we have an "*innate ground*," "*implanted*" in us by "*nature*," to perceive its objects and understand their relations the way we do, and this *ground* is really and biologically-genetically "softwired" in its universal basic structures but is nevertheless a spontaneous mind of unlimited spontaneity and creativity; which brings us into line with the perspective of *rationalist Neo-Kantianism*. Perhaps Riehl did not only deliberately ignore the second part of this passage where Kant explicitly concedes "innateness," he may also have

[777] Immanuel Kant, On a discovery whereby any new critique of pure reason is to be made superfluous by an older one (1790), in: Immanuel Kant, Theoretical Philosophy after 1781, Cambridge University Press 2002, p. 312.

been unwilling to even consider the underlying argument because of the unwelcome implications this would have for his realism, or empiricism! Other neo-Kantians are more careful in this respect but basically follow Kant's line, that is, opt for neutrality and the balancing act on the line that separates rationalism from empiricism while avoiding to place any additional emphasis on the innateness of space and time as well as the categories.

*Ernst Cassirer* relies on the same passage from Kant's reply to Eberhard but plays it fair, that is, quotes it complete. He simply notes the fact that these forms of space and time emerge in the process of being produced and are "*related to objects which are not yet given*" but does not discuss the position of the *ground* itself; the chapter just ends without further interpretations.[778] By not addressing the problem of innateness Cassirer, too, avoided committing himself in this respect even though he later took an intense interest in the gestalt theory of perception. *Hermann Cohen*, true to his tendency to "intellectualize" critical philosophy, dissociates himself even more strongly from any "naturalization." In "*Kants Theorie der Erfahrung*" he draws on the same quotation from Kant's reply to Eberhard, but unlike Riehl quotes the complete passage before noting:

"*This might be seen as contradicting the view just referred to from the Critique. For according to the latter, the 'predispositions for thinking' are not supposed to be 'implanted in us along with our existence.' In point of fact, this reveals an indecision that is sufficiently accounted for by the gradual development of the rigorous concept of the transcendental.*"[779]

At least Cohen, one of those experts who had the most profound knowledge of Kant's doctrine, draws attention to this "*indecision*". Not unlike Cassirer, however, he also goes along with Kant in conceiving of the *apriori* as the logical condition – realized in the cognitive process itself – of any cognition based on concept, intuition and judgment. As for the question, or rather the answer to the question, of why there are precisely these forms of space or time and no other, why there is precisely this kind and number of categories and no other he, too, refrains from further discussion, following Kant also in this respect.[780] In my view, the position represented by a purely "intellectual" Neo-Kantianism, i.e. strictly keeping to the transcendental constellation of experience, intuition, imagination, schema and judgment and, then, the architectonics of transcendental philosophy, is absolutely understandable, and perhaps even the one that is

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778 Ernst Cassirer, Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit, Band II, Darmstadt 1995 (1922), p. 692.

779 Hermann Cohen, Kants Theorie der Erfahrung, Berlin 1885, p. 253.

780 See the famous quotation from Kant's Critique of Pure Reason, loc. cit., p. 253f. (B 145/146).

most "correct." However, historically speaking, if Neo-Kantianism had at times to accept defeat by positivism and EAN in the broadest sense, this may well have been due to the fact that neo-Kantians had grown estranged from the natural sciences (which is true at least for Hermann Cohen whereas Ernst Cassirer sought to defend Neo-Kantianism also in a context of state-of-the-art physics, mathematics, and the theory of relativity).[781] In my view, there is no reason why the question of innate dispositions should not be approached from a biological and psychological perspective and, if corroborated by modern scientific knowledge, answered in the affirmative. This would clearly strengthen the position of the *apriori* and *Neo-Kantianism*, if not make it unassailable, because dispositions that have been "*implanted by nature*" and subjected to the prolonged "pressure test" of evolution would be very high in explanatory value while the transcendental idea would in no way be compromised, or get bogged down in the recesses of certain philosophies. On the other hand, the "*innate ground*" of the implanted laws as suggested by Kant certainly calls for further exploration – why shy away from this task? Neo-Kantianism has nothing to hide and should bring it all to light.

Now, there is a great number of other passages in Kant where he refers to "*the nature of our mind*" (CPR, A 125), the "*predispositions for thinking, implanted in us along with our existence*" (CPR B 127), and others to this effect; where he says that "*the understanding is completely exhausted and its capacity entirely measured by these functions*" (i.e. categories),[782] or speaks of "*the pure concepts of synthesis that the understanding contains in itself* a priori." None of these statements can be construed as a direct affirmation of nativism. Yet the question remains: what are these "*implanted faculties*" supposed to mean, what may be the nature of our mind, of these "*implanted predispositions*," these "*concepts of synthesis*" that "*the understanding contains in itself a priori*" and that are the same in every human being, how does Kant explain the origin of all of these faculties and powers (e.g. the power of judgment) whose "*capacity* [is] *entirely measured by these functions*" and which, therefore, exist in a structured and uniform way in all humans? How is the resulting uniformity, regularity and compelling necessity concretely possible if all this is demonstrable only in the sphere of pure logic? That Kant deliberately left this question unanswered is, for instance, documented in a well-known passage of the *Critique of Pure Reason*:

"*But for the peculiarity of our understanding, that it is able to bring about the unity of apperception a priori only by means of the categories and only through precisely this*

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781 See, e.g., Ernst Cassirer, Zur modernen Physik, Darmstadt 1987 (1920/1937).

782 Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 212 (B 106).

*kind and number of them, a further ground may be offered just as little as one can be offered for why we have precisely these and no other functions for judgment or for why space and time are the sole forms of our possible intuition*."[783]

The first thing to be noted is that Kant always speaks of the "*peculiarity of* our *understanding*," as if referring to a scientifically established fact, namely that this understanding exists in the same way in all humans. Being a rationalist, I share this view, but Kant becomes even more specific by saying that "*we have precisely these and no other functions for judgment*," which would seem to point to a specific model, or structure. Of course, these categories, or concepts or functions, of the understanding have just been painstakingly deduced and set forth by Kant in the transcendental deduction, but the sole question of "*WHY* we *have precisely these and no other functions for judgment*" of course strongly suggests that if this "we" is really "we," then all humans must be endowed with this functionality, that is, be *born* with it; that it is *universal* and *necessary* since it is "*ours.*" What, then, can be the reason why all humans are born with the same functions for thinking? Is this so formidable a mystery that it will forever remain unsolved, or isn't it obvious that the answer is to be found in terms of evolutionary heredity?

Now, there is quite a number of other observations on the issue of innate knowledge und innate faculties in Kant. But my intention here is not to draw up a random list of quotations from a broad variety of his writings but, rather, to figure out, from various statements, his view and his basic convictions. I believe that Kant, for all his reluctance to concede that innate concepts and ideas do exist, was nevertheless aware that implanted laws and natural dispositions could only mean that human beings indeed have a basic equipment of determinate faculties and powers that allow them, with necessity and universality, to come to correct and logically cogent judgments. Thus, in one of his minor essays: "*Idea for a universal history with a cosmopolitan aim*," which he wrote in 1784, the First Proposition begins with the words: "*All natural predispositions of a creature are determined sometime to develop themselves completely and purposively*." And the Second Proposition starts out as follows: "*In the human being (as the only rational creature on earth), those predispositions whose goal is the use of his reason were to develop completely only in the species, but not in the individual*."[784] Thus, firstly, Kant conceives of reason as part of the "*natural predispositions*," and according to him, natural predispositions are "*determined … to develop themselves completely and purposively*." This

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783 Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 254 (B 145/146).

784 Immanuel Kant, Idea for a universal history with a cosmopolitan aim, in: Immanuel Kant, Anthropology, History, and Education, Cambridge University Press 2007, p. 109.

is not so very unlike the "*seeds of reason*" that Descartes had so ingeniously discovered in our mind, and Kant himself says that what is *potentially* given by *nature* is supposed to "*develop … completely and purposively*." And the fact that reason is supposed to develop "*only in the species, but not in the individual*" implies that "*those predispositions whose goal is the use of … reason*" are similar in all human beings, which in turn resonates with the first sentence of Descartes' *Discourse*, namely that "*Good sense is the best distributed thing in the world*." Yet there is no denying that in spite of these obvious interpretations, there is no unequivocal statement by Kant on this issue.

In contrast to his reluctance, in the *Critique of Pure Reason*, to come to a clear conclusion on the issue of the "*apriori,*" that is, the crucial question of whether or not our understanding and our *reason* are innate, Kant does not hesitate to use the term of "*innate*" in his ethics. Thus, in "*Religion within the boundaries of mere reason*" he argues:

"*We shall say, therefore, of one of these [two] characters (which distinguish the human being from other possible rational beings) that* it is innate in him*; and yet we shall always be satisfied that* nature *is not to blame for it (if the character is evil), nor does it deserve praise (if it is good), but that the human being is alone its author*." [785] (my emphases)

Kant's problem here is that, on the one hand, he assumes that *by nature* human beings have *dispositions* towards evil while, on the other, he seeks to develop an ethics where the sense of duty, based on free choice, will ultimately overcome this weakness and lead, by the guideline of the maxims, to a morally good society. He wants to definitely rule out the possibility for the individual to claim that since they were born evil, they could not be held accountable. Yet Kant also wants to make it clear that even if, in contrast to other political doctrines, man is not "good" by nature and evil has to be expected, we can nevertheless hope for the power of reason and the sense of duty to eventually bring things to a satisfactory conclusion. Anyway – and this is important for the present discussion –, he has no problem whatsoever with describing certain traits as "*innate*" even though he obviously cannot bring himself to follow Leibniz and Descartes and commit himself accordingly with respect to the functions of the understanding. He probably feared that this might detract from the monumental achievement of having deduced the categories from the forms of judgment, which in my view would not have been the case at all. For even if one assumes (as I, for instance, do) that the pure concepts of the understanding, or *categories*, are innate just as *universal grammar* is, this would in no way detract from the merit of the person who discovered

[785] Immanuel Kant, Religion and rational theology, Cambridge University Press, 1996, p. 71.

the surface structure and deep structure of grammar (Noam Chomsky), nor from that of the person who conceived and grounded the entire architecture of the *Critique of Pure Reason*!

Kant then goes on to say:

"*Moreover, to have the one or the other disposition by nature as an innate characteristic does not mean here that the disposition has not been earned by the human being who harbors it, i.e. that he is not its author, but means rather that it has not been earned in time (that he has been the one way or the other always, from his youth on.*" (loc. cit., p. 74.)

Here, a "*disposition by nature as an innate characteristic*" seems not to pose a problem, we just have it, according to Kant, "*from … youth on*"! Even the potentiality of what is innate is addressed: even though it does not necessarily manifest itself "*phenotypically*" at birth, it may nevertheless exist genotypically and only become manifest in adolescence, if not later. There are several other passages where he expresses himself in this sense, always referring to the *innate characteristics* of man. Finally, he addresses the ideas of freedom and duty that he posits as inherent in man:

"*What is this in us (one can ask oneself) in virtue of which we, beings ever dependent on nature through so many needs, are at the same time elevated so far above it in the idea of an original predisposition (in us) that we would hold the whole of nature as nothing, and ourselves as unworthy of existence, were we to pursue the enjoyment of nature – though this alone can make our life desirable – in defiance of a law through which our reason commands us compellingly, without however either promising or threatening anything thereby? Every human being who has been instructed in the holiness that lies in the idea of duty, even one of the most ordinary ability, must feel the force of this question deeply within himself, though he has not presumed to investigate the concept of freedom which first and foremost derives from this law.*" (loc. cit., p. 93)

Here, where it suits his ethics, Kant does not hesitate to speak of something we have "*in us*", of an "*original predisposition (in us)*", of the "*idea of duty*" whose force we deeply feel within ourselves. He again speaks of an "*original predisposition*," and again, strange enough, no commentator takes offense.

In his meticulous "*Commentar Zu Kants Kritik Der Reinen Vernunft*," Hans Vaihinger devoted an entire excursus to the issue, entitled "*Wie verhält sich Kants Apriori zum Angeborensein?*" (What is the relation between Kants' apriori and innateness?) He, too, discusses the passages in question, and notes with respect to the *Critique of Pure Reason*:

"*Remarkably enough, while there are a number of indirect references, Kant never directly addresses the topic in the Critique of Pure Reason.*"[786]

[786] Hans Vaihinger, Commentar zu Kants Kritik der reinen Vernunft, Stuttgart 1892 (reprint), Vol. 2, p. 89.

So, one of the most accurate and most scrupulous commentators finds it remarkable that Kant repeatedly refers to "*our way of thinking*" "*our faculties*," an "*original predisposition*" and even goes so far, in the above-quoted passages, as to literally state that the functions are innate and yet avoids any clear commitment in this context. Vaihinger's interprets this peculiar behavior as follows:

"*True to his more conciliatory general approach, Kant here, too, seeks a middle course between Cartesius and Locke. He agrees with the former that space and time originate not from experience but – as he explicitly states – from innate laws of the mind, but insists that only these laws of coordination are innate, namely as functional forms of the human mind, not as the fixed and conscious ideas of space and time*."

He then refers to Riehl and Cohen as exponents of the respective schools of thought but criticizes both of them because in their effort to rule out the psychological view in favor of the purely logical one, they end up with a strangely indeterminate concept of the apriori in Kant. Vaihinger's comment on Cohen is somewhat more favorable since, he says, the latter had at least treated the relation between the *apriori* and *innateness* as an open question:

"*Without this conciliatory stance, the apriori would not only hang in limbo but the difference from Kant would be too obvious, so I'd rather take it to be the result of Cohen's and Riehl's reflections, inspiring and rich in ideas as they nevertheless are, that there undeniably is a strong affinity between Kant's apriori and innateness.*"[787]

Vaihinger then lists a number of commentators – among them J. Volkelt, O. Liebmann, J. Horowicz, H. Lotze, K. Lasswitz and H. Spencer – who are generally inclined to argue that Kant conceived of the apriori of space and time as well as the categories as innate. Given the findings of modern evolutionary theory, I feel that anyone who approaches this issue – namely, whether, in Kant, the a priori forms of space and time and the function of the categories are innate or "hang in limbo," as Vaihinger puts it, that is, are purely logical constructs – from the vantage point of the present and in an unbiased manner cannot but follow Kant in his critical methodology, on the one hand, and come to the conclusion, from a 21st-century perspective, that if these basic faculties, functions and structures are "implanted" they are by this very fact "innate," on the other. Integrating this basic logical insight of Plato and Descartes would in no way affect the totality of Kant's transcendental and logical architecture but provide it, on the contrary, with a logically *and* scientifically unassailable basis!

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[787] Hans Vaihinger, Commentar zu Kants Kritik der reinen Vernunft, Stuttgart 1892 (reprint), Vol. 2, p. 99.

## Carruthers: "The Case for Innate Knowledge"

Building on these considerations, I now propose to follow Peter Carruthers' argumentation in his interesting book "Human Knowledge and Human Nature" (1995), for it is a showcase of how a empiricist is led, by logical step-by-step considerations, to affirm and reason the existence of innate ideas and innate knowledge and, ultimately, jettison the famous dogmas of empiricism. Thus, a dispassionate approach is called for, and the result is a lesson in how an avowed empiricist manages to "dismantle" his own doctrine and yet still think of himself as an empiricist. In the first part of his book, Carruthers starts out by showing that "concept acquisition", that is, the formation of concepts on the basis of "sense experience," cannot happen in the way conceived by the classics of empiricism; which is largely consistent with the findings discussed in the chapter on empiricism in the present book. He then proceeds to a careful examination of Locke's well-known objections to *nativism* from Book 1 of the "*Essay*," the very arguments that, as we have seen, used to be highlighted by authors such as Wolfgang Stegmüller as an "exploit" of momentous importance for the history of philosophy.

Basically, Carruthers focuses on four arguments, dealing with them more or less as follows: Locke argues that certain principles such as "whatsoever is, is" are supposed to be innate to all humans (Essay I. i. 1–28) but that since there are – literally – "*children*" and "*idiots*" who fail to possess these principles, there can be no such innate knowledge. This argument is summarily dismissed by Carruthers as "*a bad one*."[788] Locke's other arguments are similarly trivial and completely fail to do justice to Descartes' concept of the dispositionally innate "*natural light.*" The only relevant argument put forth by Locke with respect to the nativist doctrine actually proposed by Descartes is that even if there was *latent* innate knowledge (and this is the form of innate knowledge referred to by Descartes who illustrates this kind of *latency* by comparing it to a person's *disposition* to a congenital familial disease), this was not knowledge because nothing could be called knowledge unless a person was *at any time conscious of having it*. This argument, too, is rather easily dismissed by Carruthers since there are so many things we know but are temporarily not aware of knowing. Only Locke's last argument is given more careful consideration by Carruthers, for Locke even denies that the mind has a latent disposition that allows it to build the relevant knowledge when receiving appropriate stimulation from the environment. And, interestingly, this is the very point where Carruthers, the staunch empiricist, says farewell to Locke, and the strong and irrefutable argument that prompts him

[788] Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 48ff.

to take this step is the innate *universal grammar* discovered and explained by Noam Chomsky. Taking into account Chomsky's reasoning, Carruthers concedes that while children do not have speech at birth they nevertheless have the faculty of speech like a congenital natural organ and as a directional disposition, and that this is the reason why children are able to acquire their mother tongue in a grammatically correct way even under unfavorable conditions, and why this happens on the basis of the same deep structure in virtually all languages.

Having ascertained that Locke's and Hume's arguments against nativism are weak and ineffectual and that empiricism's "concept acquisition" is unpersuasive, he comes to the following insight:

"*Not only are the direct arguments against nativism unsound, but the attempt to explain how all concepts may arise out of experience itself faces severe difficulties*."[789]

Having thus declared the bankruptcy of empiricism regarding their objections to nativism Carruthers now sets himself the task of erecting and explaining, stone by stone, the building of the "*Case for Innate Mental Structures*." Interestingly, and significantly, he starts with the chapter "Chomsky on Language." His reasons for this are twofold: firstly, when "concept acquisition" had turned out to be unfeasible and the copying of sense experiences an impasse, linguistic philosophy had proved to be EAN's last resort where the mode of language games seemed to offer them a playground which, while it was completely alien to positivism's original intentions, made up for this flaw by being vague enough to free them from any pressure to justify and explain their approach. But then Noam Chomsky came and demonstrated, with his characteristic combination of argumentative brilliance, intelligence, consistency, straightness and scientific rigor, that the structure of language, universal grammar, was the example par excellence of well-structured innate knowledge. What is more, he did this with his inimitable courage and readiness for confrontation by explicitly drawing on *René Descartes* (Cartesian Linguistics) and *Antoine Arnauld*, a supporter of Descartes' and author of the *Grammaire générale et raisonnée*, both of whom were at the time – the 1950s and 1960s – EAN's two prime candidates for being "decapitated" (Ryle) and "committed to the flames" (Hume). And, now, the empiricist Carruthers comes along and starts to make the case for innate knowledge by explicitly drawing on Chomsky – the times, they are a-changing …

"*In fact Chomsky's view is that much of our linguistic knowledge is innate, being embodied in the structure of the language faculty. When a child acquires its first language, this is not so much a matter of learning as of the language faculty being trig-*

[789] Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 61.

*gered into spontaneous growth… Crucial in the development of Chomsky's ideas has been the discovery of what he calls 'linguistic universals'. These are abstract features of syntax that have been found to be common to all natural languages."*[790]

Having understood the basic principle of *rationalism*, the empiricist Carruthers then logically extends his reasoning along the line of Chomsky's universal grammar:

"*One argument for nativism concerns the explanation of the existence of linguistic universals themselves. For why should all natural languages have features in common, unless this reflects the innate Structure of a language faculty that we all possess? Certainly there does not appear to be any general feature of our psychology, nor any general learning principle, that could explain why the syntax of all languages is phrase structure-dependent. However, an equally plausible explanation, alternative to nativism, exists in the hypothesis of a common origin. Let us suppose, as is likely, that all humankind is descended from a common stock. Then there will probably have been a time in the distant past when all living human beings spoke the same language. As different groups then dispersed around the globe, their language would have begun to change and develop, in perhaps radically different direction; but always, it may be supposed, retaining certain general features in common – today's linguistic universals*."[791]

Next, Carruthers again refers to Plato and, more specifically, "Plato's problem" in the version set forth by Chomsky, thus drawing closer to the solution proposed by the latter:

"*It appears that Plato's Problem in the case of language can only be solved if we suppose that much of the child's grammatical knowledge is already innate. The child would then only have to learn the lexicon of its language and a few grammatical rules that are language-specific...*"

So, in the end, he agrees with Chomsky that at least learning to speak one's native language must be based on *innate* capacities; but he still cannot accept the idea that the rules of grammar are embodied in the structure of the faculty of speech. So far, so good, after all he has at least partially accepted Plato's reasoning and has learned that language acquisition must of necessity rely on certain general and universal patterns. For an empiricist who should actually insist that all knowledge originates from sense experience alone, this is a crucial advance in reasoning since it marks the very point where the empiricist dogma begins to crumble and the wreck starts sinking. But Noam Chomsky has given a very precise outline of his understanding of *mental structures*:

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790 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 82f.

791 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 83f.

"*Psychology, in the sense of this discussion, is concerned, at the very least, with human capacities to act and to interpret experience, and with the mental structures that underlie these capacities and their exercise; and more deeply, with the second-order capacity to construct these mental structures, and the structures that underlie these second-order capacities.*

*The term 'capacity' is used with varying degrees of strictness. When I say that a person had the capacity to do so-and-so at a particular time, I mean that as physically and mentally constituted at that time, he needs no further instruction, training, physical development, etc., to do so-and-so if placed under appropriate external conditions. Thus a person who does not know how to swim lacks the capacity to swim, in this sense. Similarly, the Olympic swimming champion lacks the capacity to swim if his arms and legs are amputated or broken, but not if he is tied to a chair or asleep or absorbed in a book. Having the capacity to do so-and-so is not the same as knowing how to do so-and-so; in particular, there is a crucial intellectual component in 'knowing how.' We might distinguish further between what one is able to do at will and what falls within one's capacity, though we cannot do it at will. …*

*There is also a second-order sense of 'capacity,' as when we say that any normal child has the capacity to swim, or to run a mile, or to speak Italian, if only given the appropriate training or opportunities for development. In this sense, the child does not have the capacity to fly and other (terrestrial) organisms do not have the capacity to speak Italian. Sometimes the term is used more loosely, as when we speak of 'capacities' in the sense of 'mental faculties*.'"[792]

Knowing *how* to do something – i.e. to pronounce a grammatically correct sentence in one's mother tongue – is not the same as knowing how to express this grammar in technical terms and how its rules are organized. This "*knowing how*" already includes "*a crucial intellectual component,*" it is knowledge – more precisely, *innate knowledge*. Here we touch upon a decisive point. Up to now, I have deliberately spoken of *dispositionally innate capacities* and *innate knowledge* rather than innate principles and ideas. In the above passage, Chomsky has clearly stated what is to be understood by this innate knowledge, for there are actually two notions implied here, which might cause difficulties in understanding with respect to the term of "*knowledge.*" Firstly, knowledge may have different meanings, for instance, knowing that Paris is the capital of France, knowing that my wife likes to listen to the "Doors," knowing that 1 + 1 = 2, knowing how to formulate a grammatically correct sentence, knowing how to start a fire. Now, there obviously are some forms of knowledge that we need to learn by experience, while other forms of knowledge must build on dispositionally preexisting structures. Chomsky here argues that "*knowing how*," that is, how to *form* a grammatically correct sentence in one's mother tongue, is innate and that there is no need for the speaker to know the underlying grammar rules. Thus, innate knowledge is per se

[792] Noam Chomsky, Rules and Representations, New York, Columbia University Press 1980, p. 4f.

ascertained, for Chomsky could demonstrate that there are certain grammatically incorrect sentences that even children who had little opportunity to learn correct English will never pronounce: these sentences simply do not "fit" into the mother tongue. And since this is the case for all children in all languages, it constitutes serious evidence that this is not knowledge that is acquired step by step but knowledge based on some underlying innate mental structures. Moreover, with grammar, this innate knowledge is also characterized by the fact that its basic rules are not flexible but *mandatory*. Carruthers writes:

"*Another way of putting the point is that the structures that underlie our grasp of grammar do not have the sort of flexibility of behavioural effect that would be necessary for them to qualify as beliefs. (…) If we really did have beliefs about the detailed grammar of our language, underlying our ability to produce grammatical sentences, then one would expect that they could be deployed equally in the service of ungrammaticality.*"[793]

This is an interesting turn in Carruthers text, for up to this point, and in line with a certain tradition, he used to speak of "*belief*" where what was actually at issue was *knowledge*. So, in the final third of his book and along with this first acknowledgement that cognition based on "innate knowledge" cannot be synonymous with "belief," his language also begins to differ from what it was in the first parts. He moves on from the empiricist errors of the 20th century, on the one hand, but then, regrettably, relapses into a *naturalistic realism* rather than advance toward *rationalism*, on the other. Nevertheless, the newly acquired nativist view begins to change his perspective on *concepts*, as well:

"*The very fact that many of our concepts have a degree of utility that makes them unavoidable does, however, provide some slight reason for believing them to be innate. For, as we argued…in connection with perceptual concepts of space, the fact that certain linguistic concepts can be regarded as amongst the standing conditions of all human life means that there would be survival value to the individual if those concepts were innate.*"[794]

Even though Carruthers attributes the innateness of certain concepts to evolutionary survival benefits rather than the intrinsic logic of innate structures, nativist reasoning is evidently gaining ground.

But there is more to come, for Carruthers next addresses the processes of *vision*. I will abstain from describing his expedition into vision science since I have already extensively dealt with the topic in a previous chapter and have shown that in this field, the doctrine of empiricism

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793 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 90.

794 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 99.

simply collapses. At the end of the chapter, Carruthers comes to a similar conclusion:

"*In conclusion, it would seem that the classical empiricists were radically mistaken in denying that our various mental faculties embody innate information about the world. Not only does the language faculty contain information about human languages, but the visual faculty contains information about the objects in space around us. And something similar is probably true in connection with other faculties as well. Yet the innate structures of these faculties, while giving rise to innate knowledge of a rather particularized sort (such as your knowledge that a given sentence is ill formed), should not in themselves be counted as knowledge.*"

With this, the insight that the "*language faculty*" and the "*visual faculty*" are not the only ones to be innate but that this may be true for "*other faculties as well*" has become irreversible. All the same, Carruthers still cannot bring himself to accept – as he will later in his book – Chomsky's previous argument that these innate structures should be conceived of as *knowledge*. At any rate, the language faculty, the visual faculty and a number of other faculties have by now been acknowledged as *innate* by the declared empiricist Carruthers. Of course, this is Carruthers' view, and we had better not take it as evidence that there are no die-hard empiricists left who even today manage to get something out of the attack on innate ideas and principles launched by Locke in Book I of his "Essay."[795]

Carruthers now addresses the question of whether *concepts* are innate, an issue which, as we have shown in the above, can be very subtle and tricky since – and there was agreement on this point – concepts such as "raspberry ice cream" or "roundabout" are not innate in the sense that a baby is born with the respective word on her lips. Carruthers now sets forth an understanding of "concept" that is suggestive of my previous concept of "understanding of function," that is, the faculty of understanding the *function* of a thing or a fact, which is not the same as an explicit *language-based conceptual* understanding of this thing or fact; and which Carruthers differentiates from two other forms of concepts. Finally, he comes to the following résumé:

"*…we can see immediately that our basic repertoire of discriminatory-capacity concepts must be innate. If we could not, in the first place, respond differently to stimuli of different colours or temperatures, or to lines and boundaries within our visual field, then we could never learn anything else. These elemental capacities for discrimination must be built into the very structures of our perceptual apparatuses. Moreover, even where the discriminations in question are somewhat less basic (and certainly acquired over time) such as the ability to tell faces apart from one another, it may be that these discriminations are not really learned. Our face-recognising mechanisms may contain*

[795] See, e.g., S.J. Winchester, Locke and the Innatists, History of Philosophy Quarterly, Vol. 2, No. 4 (Oct., 1985), pp. 411–420.

*much innately determined information about the forms and limits of expression if the human face. So even these may count as innate (but locally triggered) concepts. It is also very likely that the basic conceptual components of non-conscious belief are innate.*"[796]

Now it gets even more interesting, for it would seem that Carruthers, now that a first empiricist dogma has crumbled, takes to wallowing in this fact like someone who has never before seen snow and can't get enough of it. For while we may rejoice in the fact that *innate faculties* and *structures* are at last acknowledged as innate, we can't help seeing a new imminent "danger," namely that of veering from *dogmatic empiricism* towards *crude naturalism*. For if the laws of gestalt, for instance, are conceived of as innate, they are innate in the sense of naturalistic "automatisms," not in terms of fixed ideas or concepts of a connection, nor in terms of *functions* of thinking. According to Kant, understanding in terms of thinking is always linked to concepts whose order we impose, by means of the imagination, or schematism, on what has been intuited. But the range of what Carruthers deems to be innate and subsumes under the heading of "concept" includes functions that are unconscious and hard to conceptualize, such as, for instance, face recognition, as well as concepts in the proper sense. I strongly feel that the differentiation proposed by me in the chapter on *vision* – i.e. between, firstly, *unconscious*, *automatic gestalt laws* of perception; secondly, the *understanding of function* as a preliminary stage of *visual thinking*; thirdly, *visual thinking* itself; and, fourthly, *conceptual thinking* in the Kantian sense – is much clearer in this respect. With Carruthers, all this gets somehow mixed up and lumped together in one category. Next, he notes that even the "concept of best explanation" must be innate:

"*There is, however, one cluster of concepts that are very likely to be innate. These are the concepts involved in the appraisal of non–deductive modes of argument, particularly the concept of the best available explanation of a given phenomenon… It is worth stressing that while the concept of best explanation does figure prominently in science, it is by no means an exclusively scientific idea. On the contrary, we each of us constantly make at least tacit use of it in the course of our daily lives.*"[797]

In the end, he comes to a positive conclusion:

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[796] Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 97f.

[797] Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 107f.

"*I conclude that, while the case for innate concepts is largely unproven, there is at least one concept that is probably innate, namely our concept of best explanation.*"[798]

The same conclusion is, then, reached for the innateness of so-called *folk psychology*. But since there is an extensive ongoing debate about folk psychology, and since even its very concept and field are unclear, I'd rather not comment on this. Basically, folk psychology is understood to be the capacity of virtually all humans to interpret and understand common reactions such as rage, joy, anger, grief etc. So, rather than risk boring the reader, I will just quote Carruthers' conclusion:

"*I conclude that we have good reason to think that the generalizations of folk-psychology are both innately believed and true. Then, since it appears that the evolutionary selection of beliefs and belief-acquisition mechanisms (at least in creatures as complex and adaptable as ourselves) is a reliable process, folk-psychology will count as innately known. So we do have substantive innate knowledge of an aspect of the world, namely the psychology of members of our own species*."

Considering that in empiricism, all knowledge is supposed to stem from "*sense experience*" alone, this already marks a noticeable increase in the number of *innate* faculties, concepts and structures, although the topics vary widely! And now, Carruthers' entire reasoning begins to falter and his entire empiricist belief goes into a tailspin. For at this point he plainly and simply renounces the second basic empiricist dogma: yes, there clearly is innate knowledge, there clearly is "*innate information bearing mental structures*," "*innate concepts*" and "*innate knowledge*," as well as what he calls "*substantive a priori knowledge*."[799]

Nevertheless, this still leaves him under the obligation to clarify what an empiricism *without* its classical opposition to nativism might look like once the tenet that all knowledge necessarily originates from sense experience alone is invalidated and the doctrine is suddenly ready to integrate innate knowledge! So, echoing the question formulated by Peter Bieri for *analytic philosophy*, we may well ask: *what remains of empiricism*? Carruthers' surprising answer is that *empiricism* could survive even if innate faculties and ideas were accepted as an outcome of evolution, that is, if empiricism was ready to reconstrue "innateness" in *naturalistic* terms and, in addition, accept the "facts" of the natural sciences and their scientistic approach as part of its epistemic core. This, however, would be the very type of natural sciences that I have already caricatured in the chapter on experiment and observation, that is, the collection of data on what is natu-

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[798] Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 110.

[799] Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 143.

ralistically "given," without any leading idea, hypothesis, or perspective. Carruthers explains:

"*In my view, the most basic empiricist commitment is to the thesis that claims to knowledge should only be granted on condition that they can be rendered consistent with our best theory of the powers of the human mind, and of the mind's natural modes of access to reality. No knowledge-claims are to be allowed, except where we can provide at least the beginnings of a naturalistic account of the processes through which that knowledge is acquired.*"[800]

The most salient feature of this definition is the permission ("allowed") to account for knowledge claims by naturalistic means, for now the cat has finally been let out of the bag: yes, there is a life after death for empiricism – from now on, its name is "naturalism"! But, as mentioned before, admitting that there are *innate* structures, faculties and even concepts means that there is a deep rift in this naturalistic-scientistic conglomerate because empiricism's foundation and starting point – *sense experience* – has ceased to exist. The entire system has lost its internal logical coherence. Carruthers must have become aware of this at some point, for he has yet another virtually inconceivable surprise in store:

"*Notice that on the account being proposed here, the traditional empiricist insistence that all knowledge must be grounded in experience turns out not to belong to the foundation of empiricism as such.*"[801]

Thus, Carruthers now boldly claims that due to the *empiricism-to-naturalism* reassignment it now turns out that not only the "war" against innate knowledge was never part of the program of empiricism, but that even the very thesis that all our knowledge was based on *sense experience* alone was never its basic dogma at all – "*turns out not to belong to the foundation of empiricism as such*"! Thus, three centuries of the empiricist "war", initiated by Locke, against rationalism end in the company's double bankruptcy, insolvency, and liquidation! Having for centuries indulged in the bashing, ridiculing, "decapitating" of rationalists and idealists (as I have abundantly documented, and especially since Ryle), in denouncing, ridiculing and humiliating them as deranged and wrongheaded weirdos, the empiricist now steps forward, because scientific facts have become irrefutable, and summarily states: "yes, everybody should be an empiricist, but let me tell you something: when it comes to our two basic dogmas, well, they are not that relevant after all. Have never been, actually. We just found out, but don't worry, you may now be naturalists instead, that's the

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800 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 129f.

801 Peter Carruthers, Human Knowledge and Human Nature, Oxford University Press, Oxford/New York 1995, p. 135.

cool thing to be, anyway." Consequentially, on the last page of his sensational book, Peter Carruthers recommends "*robust realism*." And thus we have arrived precisely where Gassendi, Locke, G.E. Moore, Russell and their entire school of thought have always been headed: *realism*, or *materialism*: touch things, gain experience through touching or handling them, put up your hand, hammer on tables and, while you are at it, go ahead and "undermine" Plato (Carruthers), "decapitate" rationalism (Ryle) and commit their works to the flames (Hume).

## Innate knowledge: current scientific facts

So far, we have discussed the issue of innate capacities and ideas in a step-by-step approach. First, there was evidence ex negativo because in the context of our criticism of empiricism, Locke's *theory of ideas* and the formation of universal and abstract concepts on the basis of "*sense experience*" alone was revealed to be untenable in the absence of pre-structured functions of the understanding. In many fields of *vision*, and more specifically regarding gestalt laws, it could then be shown that there is something which, today, is called the "*impossibility of visual perception*," that is, the fact that visual perception and the cognitive processing and reconstruction of retinal stimuli is actually impossible without innate processes. Plato, Descartes, and Kant were examined to see how they came to conceive of the existence of *innate* or *a priori* structures and knowledge as a logical requirement and what were the conclusions they proposed. We have dealt with the "*poverty-of-the-stimulus*" argument, or "*Plato's problem*," as set forth by Chomsky; and traced the development of a declared empiricist (Peter Carruthers) who found himself unable to close his mind to the growing bulk of scientific findings of the last two or three decades and began to realize that it was time for him to leave the sinking wreck of empiricism. Carruthers already provided some significant examples of innate knowledge: *universal grammar* as conceived of by Chomsky, *vision*, "*innate information bearing mental structures*," "*innate concepts*," the "*concept of best explanation*," and *folk psychology*. Carruthers' acceptance of all these fields as *innate* does, of course, not pass for evidence that this is indeed so. But it does gain in plausibility when an empiricist, after an in-depth discussion and examination, is ready to make major concessions and completely jettison his previous convictions.

Therefore, what is essential now is to present and discuss the scientific findings in favor of *nativism*, findings that have seen an enormous upswing over the last twenty years or so. As Simpson, Carruthers, Laurence, and Stich already stated in the preface to their reader "*The Innate Mind*":

"*Nativist theorizing is thriving. Present in the works of Plato, although much neglected since, nativism is once more on the forefront of contemporary developmental and cognitive theory. This resurgence owes much to the pioneering arguments of Noam Chomsky, which provided a much-needed counterbalance to the excesses of empiricism, and stimulated a huge amount of productive work in linguistics and cognitive psychology over the past half century.*"[802]

The reference to Chomsky as well as to the "*excesses of empiricism*" speaks for itself. However, the explosion of new findings about innate structures and innate knowledge in ever more fields that come up with ever more and ever more surprising facts makes it impossible for me to offer an in-depth discussion of the subject in its entire breadth. In the further course of this book, I will therefore focus on an important field (besides that of *vision* that has already been discussed in some detail) where innate knowledge plays an increasingly important role, and deal with the many as-yet-unmentioned other fields by more or less just listing them. This interesting, and increasingly well researched, field is that of the innate "*number sense,*" which is also the title of a book by *Stanislas Dehaene*.[803] Dehaene traces back the concept of *number sense* to *Tobias Dantzig* who already came up with the term in 1954.[804] It refers to the finding that even *before* they have learned the numerals themselves, infants are able to *visually* perceive and apprehend changes in sets consisting of a small number of things. Dehaene claims:

"*All people possess, even within their first year of life, a well-developed intuition about numbers. (…) Elementary additions and subtractions are already available to 6-month-old infants!*"[805]

So, what does it mean – *number sense*? There is a famous and much-quoted saying by the German-Jewish mathematician Leopold Kronecker, the teacher of Georg Cantor: "*God made the integers; all else is the work of man*." In fact, all of number theory a well as all of mathematics, or arithmetic, is based on the fact that we are able to think the concept of *unit*, *unity*, *absolute unity*, *the one*. Understanding the elementary relevance of this thinking of the unity that can be applied to whatever object or idea is one of the most grandiose achievements of classical Greek philosophy. The idea arguably dates back to the *Eleatics*, but was in its purest form

802 Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford University Press, Oxford/New York 2005, p. 221.

803 Stanislas Dehaene, The Number Sense, How the Mind Creates Mathematics, New York: Oxford University Press 2011 (1997). See also: Brian Butterworth: The Mathematical Brain, London 1999.

804 Tobias Dantzig, Number: The Language of Science, The Free Press, New York 1967.

805 Stanislas Dehaene, The Number Sense, How the Mind Creates Mathematics, New York: Oxford University Press 2011 (1997), p. XVIIIf.

first set forth by Plato – just as about everything else that is of relevance in philosophy. In his famous *Parmenides* dialogue, Plato discusses "the one" dialectically in terms of whether it is or is not, but in the *Republic* he considers it in the context of arithmetic and offers some observations that are of interest for our present concern:

"*The little matter of distinguishing one, two, and three – in a word, number and calculation: – do not all arts and sciences necessarily partake of them?*"[806]

Interestingly, in his discussion of arithmetic, Plato not just refers to *one*, *two*, and *three* but even states that *one*, *two*, and *three* is what grounds and defines arithmetic, in the first place, and elsewhere argues that the most important thing for children to learn is one, two, and three. But in the "Republic," he again refers to the importance of the *unity*, the *unit*, the *one* as an idea rather than a number:

"*You know how steadily the masters of the art repel and ridicule any one who attempts to divide absolute unity when he is calculating.*"[807]

So, we are now able to think the unity and the one and, thus, obtain the series of the naturals (N) by steadily adding yet another element of the same type and, from there, develop the whole of mathematics – which raises the question of how we are able to do this at all since the abstract *one* can never be obtained by abstraction from sense impressions, as we have already shown. And let's note in passing that for Descartes, too, "number" was one of the *simple natures*. In "The Math Gene," Keith Devlin writes:

"*Along with several other species, humans have a sense of numerosity. We recognize the difference between one object, a collection of two objects, and a collection of three objects. We also recognize that a collection of three objects has* more *members than a collection of two. This sense is not something we learn; we are born with it.*"[808]

Again, it is the numbers *one*, *two* and *three* that are assumed to be innate. Apparently, the capacity to *visually-intuitively* operate within the range of numbers from one to three, and arguably even four, without having the concept of the respective number exists even in animals, infants, and illiterate people. For animals, this has been established by a great number of tests conducted with rats, pigeons, and chimpanzees in a great variety of experimental settings and controls designed to rule out misinterpretations of and human "projections" onto the animals' behavior. It could be

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806 Plato, The Republic. Translated by Benjamin Jowett, CreateSpace Independent Publishing Platform 2013, p. 146.

807 Plato, The Republic. Translated by Benjamin Jowett, CreateSpace Independent Publishing Platform 2013, p. 147.

808 Keith Devlin, The Math Gene: How Mathematical Thinking Evolved And Why Numbers Are Like Gossip, Basic Books 2000, p. 10.

shown, clearly and irrefutably, that the animals were quite proficient in navigating the range of numbers from one to three, irrespective of the type of test and the species. However, increasing the number of items in the test design also led to an increase in the number of errors. In 1983, and as a conclusion from numerous tests, the researchers Meck and Church proposed the concept of an evolutionarily developed innate structure which they called *accumulator*. What is meant by this is a brain module that is obviously capable of *visually-intuitively* estimating quantities. From an evolutionary perspective, this would indeed make "sense" since survival may well depend on the ability to distinguish, lightning-fast, between three or one when it comes to the number of enemies, or whether there is always only one grain to be found, or three at a time. Dehaene adds to this finding by positing a *magnitude effect*, i.e. that estimations tend to become increasingly vague as the number of items increases, as well as a *distance effect*, i.e. the smaller the distance between certain numbers the greater the vagueness of estimations. Thus, animals are quite good at distinguishing between 3 and 8 units, and less good at distinguishing between 3 and 4 units where the difference is less obvious.[809] Gelman and Gallistel further explored and enhanced the accumulator model:

"*We suggest that it is the system of real numbers that is the psychologically primitive system, both in the phylogenetic and the ontogenetic sense*."

And, even more crucial:

"*Our thesis is that this cultural creation of the real numbers was a Platonic rediscovery of the underlying nonverbal system of arithmetic reasoning.*"[810]

This means that the numerals and concepts of arithmetic were "grafted," as it were, on a much older system as a means of denoting and expressing something that is *intuitively* always already grasped at a *visual-cognitive* level. This seems to work not unlike *universal grammar*. According to this thesis, Plato had logically grafted the unit for numbers on the intuitively already existing number system of one, two, three. Laurence and Margolis characterize the significance of this system as follows:

"*The object indexing system is a psychological mechanism that supports the visual tracking of a small number of objects. Several similar models have been proposed, but the basic idea in each case is to have reassignable indexes that function as abstract representations of individual objects (see, e.g. Leslie et al., 1998). In adult humans the number of indexes is about four – a number that derives from work on object-based*

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809 Stephen Laurence, Eric Margolis, Number and Natural Language, in: Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford University Press, Oxford/New York 2005, p. 221.

810 Gallistel C., Gelman R., Non-verbal numerical cognition: from reals to integers. Trends in Cognitive Sciences, 2000 Feb;4(2):59–65.

*attention studies in vision (Trick & Pylyshyn, 1993). The indexes are abstract in that they don't inherently represent the color, shape, texture, or any of the features of an object. They are sometimes likened to fingers, which can point to a thing without thereby conveying any of its features. Object indexes are able to do this because they track objects, in the first instance, by responding to their spatial-temporal properties.*"[811]

The fact that animals could be shown to have a definite, and reproducible, "*number sense*" gave rise to the further question of how to demonstrate this "innateness" in humans and at the same time rule out that understanding and operating with numbers was acquired in some way or another and could, therefore, originate from experience. Now, the best model for investigating this issue are infants, and more specifically infants not yet able to talk, for with them, it could be ruled out that they had already learned the numerals, or learned to operate with numbers, so this capacity had of necessity to be innate. Karen Wynn is a pioneer in this field, having published her findings 1992 in "*Nature,*" a top-level science journal. In an elegantly and creatively designed series of experiments, she could show that at the age of 5 months, that is, long before they knew any number words, thus, before someone could have taught them anything about numbers, infants were able to distinguish the difference, or equivalence, of small numbers of items as well as perform "*simple arithmetical operations on small numbers of items*." Her conclusion in "*Nature*" was:

"*Human infants can discriminate between different small numbers of items, and can determine numerical equivalence across perceptual modalities. This may indicate the possession of true numerical concepts. Alternatively, purely perceptual discriminations may underlie these abilities. This debate addresses the nature of subitization, the ability to quantify small numbers of items without conscious counting. Subitization may involve the holistic recognition of canonical perceptual patterns that do not reveal ordinal relationships between the numbers, or may instead be an iterative or 'counting' process that specifies these numerical relationships. Here I show that 5-month-old infants can calculate the results of simple arithmetical operations on small numbers of items. This indicates that infants possess true numerical concepts, and suggests that humans are innately endowed with arithmetical abilities. It also suggests that subitization is a process that encodes ordinal information, not a pattern-recognition process yielding non-numerical percepts.*"[812]

So, there was evidence that even five-month-old babies were able to understand small quantities of items and do simple computations. It stands to reason that, once developed, this capacity was surely worth preserving

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811 Stephen Laurence, Eric Margolis, Number and Natural Language, in: Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford University Press, Oxford/New York 2005, p. 227.

812 Karen Wynn, Addition and subtraction by human infants, *Nature* 358, 749–750 (27 August 1992).

genetically. Also, Karen Wynn refers to "subitizing." *Subitizing* is an interesting capacity that had been discovered and systematically explored as early as in 1949 by Kaufman and colleagues.[813] George Mandler comments on their findings as follows:

"*… the rapid, confident, and accurate report of the numerosity of arrays of elements presented for short durations. They noted that this process, different from counting and estimating, was restricted to arrays with 6 or fewer elements.*"[814]

This means that test persons had no problem to quantitatively grasp irregular arrays of dots without counting them, with estimation times significantly increasing with collections of more than 6 dots. Mandler and Shebo confirmed the findings by Kaufman et al. but introduced an interesting refinement by testing so-called "canonical patterns," i.e. a type of patterns you find on a dice, for instance, in addition to randomly scattered dots. This led to quicker and more accurate results, with top performance in the range between 1 and 3 dots, as expected, and again a threshold at 6 dots, beyond which estimation times significantly increased. Up to 6 dots, people can simply "see" results *intuitively*, *they do not count*, they grasp them by intuitive evidence, not unlike what Descartes describes with respect to *simple natures*. These simplest structures and connections, such as pips on a dice, can be accessed by simple, intuitive, direct insight that is equivalent to visual apprehension. Everything over and above this range must be counted, estimated, or computed. These results have been substantiated by numerous more recent and – due to brain scans and technical improvements – more sophisticated studies. A recent study by Anobile and Burt resulted in the following finding:

"*Research over the last few decades has firmly established that number is a perceptual attribute: Humans are able to make rough but rapid and effortless appraisals of the quantities of a cloud of items, estimating numerosity efficiently over an extremely wide range, from unity up to hundreds or even thousands of items. In this review, we propose three distinct processes, working over distinct ranges. In the low subitizing range, up to about four, estimation is both rapid and errorless.*"[815]

This observation brings to mind Descartes' description of the *intuitive evidence* of *simple natures* "*which is so easy and distinct that there can be no room for doubt about what we are understanding,*" and which is by now clearly confirmed by science. In this context, it is imperative to once more emphasize that this is not about any direct copying of images of *simple*

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813 E.L. Kaufman, M.W. Lord, T.W. Reese and J. Volkmann, The American Journal of Psychology, Vol. 62, No. 4 (Oct., 1949), pp. 498–525.

814 Mandler, G., & Shebo, B.J. (1982). Subitizing: An analysis of its component processes. Journal Of Experimental Psychology: General, 111, 122.

815 G. Anobile, G.M. Cicchini, D. Burr. Number As a Primary Perceptual Attribute: A Review, Perception 2015, 01–27.

*impressions or ideas*, i.e. the "bad" immediacy of empiricism and realism, it is about the intuitive grasping of *the simplest relations*, i.e. the "three units" in the above case, that corresponds to intuitive thinking such as it was first ascertained by Descartes with respect to the *simple natures*!

But let's once more return to Karen Wynn. In her highly interesting publication "*Evidence against empiricist accounts of the origins of numerical knowledge*," she contrasts the scientific findings of the last decades with the beliefs held by empiricists. She describes the basic assumptions of these *beliefs* as follows:

"*The standard empiricist explanation of how we possess such knowledge is that we acquire even the simplest understanding of numerical relationships from observations of the world. (…) John Stuart Mill (1843), for example, held that we learn numerical truths, such as that one plus two equals three, by observing it to be true for sheep in one instance, for cookies in another instance, and so on, until finally we induce that it is true in all cases. Kitcher (1984, 1988) is perhaps the contemporary philosopher who has spelled out in most careful detail an empiricist view of the origins of numerical knowledge. Kitcher's proposal is that individuals learn the simplest mathematical facts from observing the results of their own actions, and learn the rest of mathematics from parents, teachers and other authorities, who obtain their knowledge from the current mathematics experts.*"[816]

Evidently, the belief that we can learn real numbers simply by observing sheep or cookies and from explanations by parents, without pre-structured innate knowledge, persists even today. By contrast, Karen Wynn explains:

"*Over the last ten years it has been clearly shown that human infants are sensitive to number. For example, studies have shown that newborns (Antell & Keating, 1983), 5-month-olds (Starkey & Cooper, 1980), and 10-month-olds (Strauss & Curtis, 1981) are able to discriminate small numerosities; they can tell two from three and, under certain conditions, three from four.*" (loc. cit.)

She concludes:

"*The experiments reviewed above show that human infants and other animals possess sensitivity to numerosity, and an ability to determine the results of simple arithmetical operations. The fact that these abilities are evident in a wide range of species and at a very early age in human infancy suggests that we are innately equipped with such knowledge, rather than learning it through induction over experience.*" (loc. cit.)

Dehaene drew exactly the same conclusion from two decades of tests and experiments:

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816 Karen Wynn, Evidence Against Empiricist Accounts of the Origins of Numerical Knowledge, Volume 7, Issue 4, pages 315–332, December 1992 (online 2007).

"*An organ specialized in the perception and representation of numerical quantities lies anchored in our brains. Its characteristics unequivocally connect to the protonumerical abilities in animals and in infants.*"[817]

In recent years, these findings were further confirmed and substantiated. Thus, Ernst Cassirer was quite right in predicting that the advances of the empirical sciences would step by step corroborate the positions of *rationalism* from Plato to Kant and disprove the beliefs, based on Locke's and Hume's self-observation experiments, of empiricism.

Dehaene summarizes the insights that have been gained up to this point as follows, first highlighting the capacity of "*subitizing*" the numbers 1, 2, and 3:

"*The numbers 1, 2, and 3 seem to be recognized without any appearance of counting. (…) I therefore believe that subitizing in human adults, like numerosity discrimination in babies and animals, depends on circuits of our visual system that are dedicated to localizing and tracking objects in space.*"[818]

This is a very important argument for, firstly, it confirms the experimental findings regarding the special status – already discovered by Plato – of the numbers *one*, *two*, and *three*. Secondly, Dehaene emphasizes that *subitizing* means that these numbers are grasped by the *visual system* and as *intuitive evidence*, with no counting involved, and that it is based on the process of identifying objects in space. The affinity to *gestalt laws* and to Descartes' conception of the innate, intuitive grasping of *simple natures* is quite evident here – visual thinking is already in the air. The fundamental significance of one, two, three is even anchored, as Dehaene very lucidly explains, in the Indo-European languages. They are not only grammatically different – "[*i*]*n languages with case and gender inflections, 'one,' 'two,' and 'three' are often the only numerals that can be inflected*" (loc. cit., p. 80) – they are also linked to numerous other meanings, with 2 often meaning "another" ("second") and 3 signifying "a lot" or "very" (French "très"). In the language of an aboriginal tribe from Australia, there are "names only for the quantities 1, 2, some, and a lot" (loc. cit.). In many languages, the word for number is etymologically linked to the finger (digit/digital), the hand denotes 5, and for the Gauls and the French, 20 is something special, being the maximum number to be signified by the joint numbers of fingers and toes, etc. Once again, the order of the integers, the natural numbers, originates from something like an *object indexing system* (as Kant demonstrated for the addition of 7 + 5 = 12), it has a *visual rather than linguistic origin* or, inversely, the linguistic number system has devel-

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817 Stanislas Dehaene, The Number Sense, How the Mind Creates Mathematics, New York: Oxford University Press 2011 (1997), p. 75.

818 Stanislas Dehaene, The Number Sense, How the Mind Creates Mathematics, New York: Oxford University Press 2011 (1997), p. 57.

oped from visual apprehension. This is also emphasized by Leslie, Gallistel, and Gelman:

"*No child would ever entertain exact integer values, and for just that reason no language would contain common words for 1, 2, 3; instead, one, two, three would be specialist words, like pi or e. Yet children regularly do entertain integer hypotheses, and for just that reason, the count words (in languages that have them) have integer values as their meanings*."[819]

What we have up to now discussed – based on Karen Wynn's studies with infants or Laurence and Margolis' "*object indexing system*" – is the *intuitive*, *lightning fast* grasping of the number of objects in small sets, i.e. between one and four items, which is the innate cognitive basis for the development of numbers. But Dehaene has also studied the inverse process, namely what we are thinking when we grasp numbers and, more specifically, *how* we think them. And this is what he found as a result of his studies:

"*An Arabic numeral first appears to us as a distribution of photons on the retina, a pattern identified by visual areas of the brain as being the shape of a familiar digit. Yet, the many examples that we have just described show that the brain hardly pauses at recognizing digit shapes. It rapidly reconstructs a continuous and compressed representation of the associated quantity. This conversion into a quantity occurs unconsciously, automatically, and at great speed. It is virtually impossible to see the shape of digit 5 without immediately translating it into quantity five – even when this translation is of no use at all in the current context. Understanding numbers, then, occurs as a reflex. Suppose you were shown two digits side by side and were asked to tell, as fast as you can, whether they were the same or different. Surely you'd think that you might base your decision exclusively on the visual appearance of the digits — whether or not they share the same shape. But measurement of response times shows that this supposition is wrong. Deciding that 8 and 9 are different digits takes systematically longer than reaching the same decision for digits 2 and 9. Once again, numerical distance governs our speed of responding*."[820]

What Dehaene found is that in our consciousness, the numbers are spatially organized to form something like an *imaginary number line*, that is, not as the *numerals* we read but as schematic quantities that follow a "spatial" order. Therefore, we unconsciously see 5 as a quantity and associate it with five dots, or units, and find it harder to spontaneously differentiate between 8 and 9 since the spatial difference is smaller than that between 2 and 9 (test response times increase significantly):

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819 A. Leslie, C.R. Gallistel, R. Gelman, Where Integers Come From, in: The Innate Mind, Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), Oxford University Press, Oxford/New York, Vol. 3, 2007, p. 116.

820 Stanislas Dehaene, The Number Sense, How the Mind Creates Mathematics, New York: Oxford University Press 2011 (1997), p. 66f.

"*The finding of an automatic association between numbers and space leads to a simple yet remarkably powerful metaphor for the mental representation of numerical quantities: that of a number line. It is as if numbers were mentally aligned on a segment, with each location corresponding to a certain quantity.*"[821]

In his book "Visual Thinking in Mathematics," Marcus Giaquinto puts this phenomenon in perspective:

"*The standard horizontal number line is clearly a product of culture, as it depends on culture-specific convention of a written numeral system. But it depends on three innate faculties: our number sense, our sense of the space around us, and the visual imagery system. The representations of our number sense are mapped onto the representations of our numerals, which in turn are mapped onto a horizontal line (or are arranged in a row) to form an integrated system of numerical representations in the imagery system; when activated, the resulting image is integrated into the representation of egocentric space. So we have an example of a basic resource of human intelligence that is the product of an interaction between cultural and innate endowments.*"[822]

There are two reasons why these observations are very interesting indeed: firstly, in the chapter on Kant's schematism, we will again come upon the *number 5* that Kant *schematizes* as 5 dots in a row, thus obtaining an *intuitive* representation of the concept "five." Of course, in this context, *intuitive* does not simply mean that we have the image of the five dots on our retina, it means that we visually grasp "fiveness." This is something altogether different from mere "looking at." Secondly, Kant arranges the dots in a row because he wants to represent counting as a *temporal* process of the internal sense, which puts him in accordance with Dehaene's discovery, namely that we follow the spatial axe of time until we reach the number 5 – an interesting consistency indeed.

In his 2011 edition, Dehaene finally summarizes the scientifically established facts, corroborated as they are by the most cutting-edge brain scans and empirical experiments:

"– *That the human baby is born with innate mechanisms for individuating objects and for extracting the numerosity of small sets.*
– *That this 'number sense' is also present in animals, and hence that it is independent of language and has a long evolutionary history.*
– *That in children, numerical estimation, comparison, counting, simple addition and subtraction, all emerge spontaneously without much explicit instruction.*
– *That the inferior parietal region of both cerebral hemispheres hosts neuronal circuits dedicated to the mental manipulation of numerical quantities. Intuition about numbers is thus anchored deep in our brains.*"

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821 Stanislas Dehaene, The Number Sense, How the Mind Creates Mathematics, New York: Oxford University Press 2011 (1997), p. 70.

822 Marcus Giaquinto, Visual Thinking in Mathematics, Oxford University Press, Ox-ford/New York 2007, p. 115f.

Having thus summarized the major points, Dehaene comes to the decisive – from a philosophical point of view – conclusion:

"*The structure of our brain defines the categories according to which we apprehend the world through mathematics.*" [823]

We have again reached the point where a crucial turn and further insight emerge. Just as in *vision*, innate gestalt laws determine *how* we see the world, and the laws of vision actually "dictate" *how* things ultimately present themselves to us among the innumerable possibilities of the "inverse problem," and just as universal grammar forms the structure of our grammatical syntax, there are innate structures that determine how we "see," order, think, and intuitively deal with numbers. Modern mathematics of course treats numbers according to the historically developed axioms and rules. And modern research once again brings to light the *very opposite* of what empiricism believes, namely that – as most naively proposed by John Stuart Mill – we gradually "abstract" the numbers from sheep and cookies. Modern science substantiates what Plato and Descartes had logically extrapolated, namely that there must be an innate "a priori" basis for grasping numbers, or absolute unity, that is, *one*, *two*, and *three*. Number, as Descartes taught in his *Regulae*, is an example of a "*simple nature*" that we intuitively grasp. Due to the scientific findings of the last three decades, we now also know why this is so, and can attribute the origin of innate forms and innate knowledge to evolutionary history *without* having to resort to some myth, or to God, as the originator of this faculty. So, the collapse of empiricism's first basic criterion with respect to the theory of perception, i.e. "*sense experience*," is now followed by the bankruptcy of the claim, raised by Locke, Hume, and their followers, that there is no innate knowledge.

In fact, the last decade has seen a real explosion of scientific findings that reveal ever more fields of thinking as innate – as if the dam of a great dogma had finally burst. Of course, we also find the shrewd survival strategy, paradigmatically deployed by Carruthers, i.e. coopting these new findings for *naturalism* to somehow preserve certain elements of empiricism. Nevertheless, the paradigm of *innate knowledge* remains the intellectual property and basic principle of *rationalism*! So, let's now take a closer look at the capacities and faculties as well as elements of knowledge that are today considered innate. First, studies on infants – who impose themselves as the "natural" models for research on *innate knowledge* because abstracting knowledge from things, that is, from sense impressions is rather unlikely, if not impossible, at the prelingual stage – have brought to light more and more of these capacities. One of the pioneers in this field

[823] Stanislas Dehaene, The Number Sense, How the Mind Creates Mathematics, New York: Oxford University Press 2011 (1997), p. 227.

is Elizabeth Spelke who has dealt intensively with learning and cognition in infants. In this, her initial question was how babies and infants gradually move from a state where they know virtually nothing to a state of knowledge of the world – that things will fall downward, that they themselves may fall, that a thing cannot be in the same spot as another thing, etc. She writes that although the EAN standard explanation used to be: "from experience," growing doubts prompted her to conduct research and studies designed to understand precisely how this knowledge actually emerges in infants. Many years of research eventually led her to the conclusion that there is a *core* of innate a priori knowledge which she calls "*initial knowledge*."[824] This initial knowledge is the innate basis on which all further knowledge can build in response to environmental conditions.

What in 1994 was still seen as Elizabeth Spelke's controversial position has in the meantime been more and more corroborated and is today accepted as scientifically verified knowledge. Gary Marcus summarizes the entire range of new insights as follows:

"*In the last several years, our understanding of the genesis of the human mind has undergone radical revision. Babies were once thought to be blank slates, infinitely malleable. But dozens of recent experiments have shown that babies come to the world able to think and reason. As soon as they are born, babies can imitate facial gestures (Meltzoff & Moore. 1977), discriminate Dutch from Japanese (Nazzi et al. 1998), and distinguish a picture of a scrambled face and a picture of a normal face (Johnson et al. 1991). Within a few months they can anticipate sequences of events (Haith et al., 1988), keep track of objects that they cannot see (Spelke & Kestenbaum, 1986; Wynn, I992) and discern abstract patterns in artificial languages (Gomez & Gerken, I999; Marcus et al., I999). Nativists like Steven Pinker (1994) and Stanislas Dehaene (1997) have suggested that infants are born with a "language instinct" and a "number sense." Elizabeth Spelke (1994) has argued that infants are 'endowed with abilities to perceive objects, persons, sets, and places.' Since the function of our minds comes from the structure of our brains, these findings suggest that the micro-circuitry of the brain is innate, largely wired up before birth.*"[825]

And even more recently, Kathleen Wermke, a linguist specialized in infants, could demonstrate that a newborn's first cries are already shaped by the tonality of their mother tongue.[826] Thus, the cries of a German newborn differ from those of a Chinese newborn, and both differ from those of an African newborn. Whether these differences are innate or whether

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824 Elizabeth Spelke, Initial Knowledge: Six Suggestions, Cognition, 50 (1994), 431–445. S. Carey, E. Spelke, Science and Core Knowledge, Philosophy of Science, Volume 63, Issue 4, Dec. 1996, 515–533.

825 Gary Marcus, What developmental Biology Can Tell Us about Innateness, in: Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford/New York 2005, p. 23.

826 Kathleen Wermke, Maternal language shapes infants' cry melodies, Science Daily, 19. August 2016. https://www.sciencedaily.com/releases/2016/08/160819084631.htm

infants learn to emulate the melody of their maternal language while in the womb is still unclear, but probably both factors are involved. The assumption is that language development starts in accordance with a universal pattern that is based on universal grammar. Nothing could be farther from Wittgenstein's drill ("Abrichtung") and Quine's inculcation or "training on the part of society"!

If at birth, the neonate's brain is to a great extent biologically pre-structured, and if this pre-structuring is closely linked to definable innate capacities, then a number of questions arises. Firstly, there obviously *is* a predefined *functionality* and a certain defined structure as well as "scope" of these capacities. But there is also the need to differentiate among what we are dealing with here, that is, to identify precisely *what* is innate. For the biological, neuronal foundation of the brain rests on a genetically formed basis and is, thus, capable of ensuring a certain basic functional orientation of the mind. Also, as a biological system, the brain must from the start be malleable and adaptive, so it could be that even the embryo already responds to stimuli to an extent that is very difficult to assess. The philosophically relevant idea here is that the universal bases of thinking and language are functionally the same in all humans, and *dispositionally* relatively similar in their potential (Descartes). At the same time, any direct, analogous inference of concrete knowledge from biological structures is completely beside the point, as we have repeatedly discussed and explained. Thus, there are certain basic capacities of thinking whose basic macrostructures are predetermined by the biological matrix, on the one hand, while in terms of content and microstructures, the mind is self-conscious, autonomous, creative, and spontaneous, on the other. The formation of thinking is based on this similar human potential, with education, the cultural environment, schooling, society, educational establishments, and many more factors enriching, shaping, and "refining" it. Nevertheless, while basic structures such as "*universal grammar*" or the "*number sense*" are structurally innate, fixed concepts such as "raspberry ice cream" are not.

The second important point that needs to be considered is that the brain of the neonate comes with a huge number of neurons and adapts in response to the stimuli received during the first 6 to 9 months, while neurons that are not stimulated may partially degenerate or even be redefined. Other neurons may develop later, some not at all. We are already aware of the relevance of this kind of time slots with respect to the formation of the structures of language acquisition in children. Learning to speak their mother tongue without any accent is easiest for young children. At about ten years of age, the neuronal "window" begins to close, and it is extremely rare for adults to learn to speak a foreign language without any accent at all. This is not an intellectual or learning disability but a neuronal issue.

For vision, this "window" is open at a much earlier developmental stage, and for a much shorter time; also, it is more sensitive to deficits. Any talk of a definite and fixed "innateness," on the one hand, or a "tabula rasa," that is, a neonate brain that is a "blank tablet," on the other, is one-sided and inadequate. But the crucial point is: if there is one element that is decisive for the *uniform* development of mental *faculties* and mental *functions*, an element that is "mind-forming," as it were – then it's these basic innate structures, even though they will be subject to a multitude of influences. *Sensory perceptions* alone can never suffice to allow for the acquisition of one's mother tongue, nor of all those other capacities that infants have been found to possess.

Furthermore, the relation between genetical equipment and neuronal structure also needs to be considered, as well as the relation between the neuronal structure and the mind. It has to date been impossible to establish a direct, mono-causal connection between the approximately 100 billion neurons of the brain and our less than 30,000 genes. Since the development of the brain was accompanied by the emergence of a spontaneous and creative self-conscious intelligence that, as Kant has taught us in his antinomies, can initiate, anytime and at its own discretion, a new causal chain in this physical world, and since there soon will be 10 billions of these brains on earth that, in turn, will initiate an enormous number of causal chains, any monistic-reductionist or physical doctrine is grotesque, and doomed to fail. Descartes' ingenious, if disconcerting, insight that the *res cogitans* is "*entirely different*" from the *res extensa* is incontrovertible and will outlast all attacks, trivial or non-trivial. This relation between the human genome and the number of neurons is, of course, further complicated by the control mechanisms of, and hierarchies among, the genes themselves, as well as by signal pathways and epigenetics. Thus, we can today determine the topography of individual brain cells and link it to certain cognitive activities, whereas it is obviously impossible to directly capture the content of individual thought processes, let alone how these manifold thoughts and contents are subjectively experienced.[827] These considerations bring us back to the question of precisely what we are to understand by the term of "innate." Here's a somewhat biologistic suggestion by Haidt and Joseph:

"*The word has been used in so many ways by philosophers, biologists, and ethologists (Wimsatt, 1999, lists 13 distinct meanings) that some scholars have despaired of finding the concept useful at all (e.g., Griffiths, 2002). But we find a simple and congenial approach in the writings of Gary Marcus (2004), who studies the developmental pathways by which genes guide the construction of brains. Marcus uses the metaphor*

[827] Gary Marcus, What developmental Biology Can Tell Us about Innateness, in: Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford/New York 2005, p. 227.

*that genes create the first draft of the brain, and experience later edits it: 'Nature bestows upon the newborn a considerably complex brain, but one that is best seen as prewired – flexible and subject to change – rather than hardwired, fixed, and immutable' (p. 12). Marcus further explains that the editing – the changes in the brain as it learns and grows – is itself governed by genetic processes. Genes are not just templates for making proteins, as was thought decades ago, rather a part of each gene is devoted to regulatory processes – switching the gene on and off in response to various chemical signals.*"[828]

This leads to a significant parting of ways between the positions of *evolutionary epistemology* and *naturalism*, on the one hand, and rationalist Neo-Kantianism, on the other. For the innate biological structures are the elementary basis of thinking and define the "scope," or potential, of the faculty of thought. Here a contradiction seems to arise: for, on the one hand, there is the claim that various faculties are dispositionally innate while, on the other, there is the assumption of a free, creative, spontaneous, and autonomous mind. However, we must not lose sight of two facts: it is true that the biological basis structurally enables visual and, subsequently, language-based thinking. But once this structural domain has developed and is fully formed and we have become self-conscious, it is up to us, in terms of Descartes' "division of powers," to keep developing in the mental domain and not let ourselves be misled into substituting the self-conscious, creative mind by biochemistry and nerve fibers, since both domains are "*completely different*." Let me illustrate this by, say, a movie script that has been realized by different directors. The plot and, in most cases, the title may basically be the same but there is no telling what difference the casting will make, how the parts will be enacted, whether or not actors will improvise, how widely dialogues, settings, the camera work, the pace of the action will differ. And yet, nobody will deny that it is the same script and that in both movies, the action reflects the same basic theme and is not made up of a random succession of experimental film sequences. My second point concerns the relation between the biological malleability and plasticity of the brain, on the one hand, and the immutability of the *grammatical deep structure*, the *simple natures*, and the *categories*, that is, the universal *functions* of thinking. In this respect, there seem to be fixed physical laws – at least in the world known to us – that over a long period of time have become biologically-genetically deep-rooted. Due to the constancy of the physical conditions of the world, the basic biological equipment of man, too, seems to be relatively stable. Nevertheless, the future is open also in this respect, an indication being the brain's plasticity in the process of learning to read, as Stanislas Dehaene

[828] Jonathan Haidt, Craig Joseph, The Moral Mind, in: Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford University Press, Oxford/New York, Vol 3, 2007, p. 367.

has shown in his book "Reading in the Brain" and Maryanne Wolf in "Proust and the Squid." The brain of a person who can read will never again be structurally the same as the brain of the illiterate, and, inversely, the brain of an internet addict undergoes biologically verifiable changes that tend to adversely affect their ability to read. To sum up, we can say that in terms of their basic structure, the brain functions of homo sapiens are the same in every individual but that in terms of content, no inference whatsoever is possible. It is like the case of the tap of a finger one someone's shoulder: there is more than one way to interpret it. Naturalism simply falls short in this respect.

Now, there is a number of other domains where innate knowledge is playing an increasingly important role. I will, however, confine myself to simply listing them since we would otherwise get lost in an endless series of questions of detail. In recent years, there also is an increasing number of publications where even certain behaviors in the domains of morals and politics are assumed to be innate. Here, Immanuel Kant's famous reflection on "*… the starry heavens above me and the moral law within me*" is put on a modern scientific foundation since the moral law is, of course, "implanted." Shaun Nichols is an exponent of this current, cross-referring not only to Noam Chomsky but also to Descartes and Plato:

"*Although linguistic nativism has received the bulk of attention in contemporary innateness debates, moral nativism has perhaps an even deeper ancestry. If linguistic nativism is Cartesian, moral nativism is Platonic. Moral nativism has taken a backseat to linguistic nativism in contemporary discussions largely because Chomsky made a case for linguistic nativism characterized by unprecedented rigor. Hence it is not surprising that recent attempts to revive the thesis that we have innate moral knowledge have drawn on Chomsky's framework.*"[829]

Even though Nichols basically tends to consider innate affective structures as the cognitive basis of moral choices, this is part of an important and interesting debate where the issue, as we have already pointed out, no longer is that there is *no such thing* as innate knowledge but simply *which innate knowledge* is more likely to play the key role in a certain domain, and to what extent.

Another recent contribution to this subject is Marc Hauser's book "*Moral Minds*" where Hauser, drawing on many examples, seeks to make a case for the thesis that there is an innate and universal moral sense.[830]And I could continue in this vein, citing dozens of recent studies and experiments that produce evidence of innate knowledge and innate faculties in a

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[829] Shaun Nichols, Innateness and Moral Psychology, in: Peter Carruthers, Stephen Laurence, Stephen Stich (eds.), The Innate Mind, Oxford University Press, Oxford/New York 2005, p. 353.

[830] Marc Hauser, Moral Minds, Harper Perennial, New York 2007.

wide variety of domains. But since reasons of space prevent me from discussing them here, I can just encourage the reader to give them a try. An example would be, for instance, a recent study conducted with descendants of the Maya in the Guatemalan jungle, who lack literacy as well as numeracy. The study shows that when tested for their ability to estimate *probabilities* for quantities, their results were at the same level as those of Western control groups, which suggests that the ability to estimate quantities exists intuitively, and independently of any education. Incidentally, for the tests, *visual* arrangements and tasks were used.[831]

**Conclusion:**

1. The doctrine that human beings have dispositionally innate faculties and innate knowledge that enable them to structure the manifoldness, or "rhapsody," of sense impressions and to carry out simple practical and logical operations is one of the classical cornerstones of *rationalism*. *Rationalist Neo-Kantianism* assumes that innate faculties and innate knowledge have their roots in cognitive structures that were acquired in the course of evolution, i.e. that the a priori functions of thinking have to be grounded in biological-genetical rather than mythical or religious terms; and that, at the same time, these structures ensure the *universality* and *necessity* of human thinking that is rooted in these innate structures.
2. Even though, due to the historical situation of 350 BCE, the origin of the doctrine of *nativism* in Plato has a certain mythological connotation, the question of innate knowledge was raised, as has been shown, on a purely logical basis and was further developed within the limits of what was thinkable at the time. Descartes, it is true, offers some observations that locate innate ideas in a religious context, but there is also quite a number of passages where he speaks of the *nature*, or the *natural* origin, of these faculties and this potential knowledge, while terms such as "*natural* light" and "simple *natures*" speak for themselves. In Kant, as discussed, the *a priori* structure, i.e. the intuition of space and time, as well as the categories and the schemata also speak for knowledge that has been "*implanted*" by nature, as do all the "*faculties*" and "*powers*" of the mind, even though Kant avoids a clear commitment with respect to these "*natural acquisitions*." Why all humans have the same categories for judgment, and only these categories – this is a question that remains unanswered in Kant.
3. However, the fact that the basic equipment of the mind was evolutionarily developed and anchored does not mean that thinking is to

[831] L. Fontani et al., Probabilistic cognition in two indigenous Mayan groups, PNAS Dec 2, 2014, vol 111, no. 48 17075–17080.

be defined in purely biological terms, or is "pre-programmed" in the manner of a pocket calculator. It only means one thing, namely that a subject's self-conscious, spontaneous thinking follows certain "pathways" or forms, specified as *forms* in Plato, as the *natural light* that grasps the *simple natures* by way of *intuitive evidence* in Descartes, and as the *functions* of the *categories* in Kant.

4. This classical nativist position has gathered momentum in recent decades, but most of all due to the new way of thinking in linguistics initiated by Noam Chomsky. Chomsky could show that children's acquisition of *language* – the key medium of analytic linguistic philosophy – is only possible and can only be explained if there is an innate structure, a *universal grammar*, that enables them, even if their parents are aphasic, to overcome the "*poverty-of-the-stimulus*" situation and within a relatively short time acquire the language to a degree of proficiency that makes it their commonly understood mother tongue.
5. In the wake of the turn to *universal grammar*, more and more faculties and types of knowledge were identified as innate, among them essential domains such as the "number sense," the gestalt laws of perception, geometrical capacities, face recognition, steep cliffs fear, folk psychology, the moral sense, and many more.
6. In all this, it is essential for *rationalist Neo-Kantianism* to not leave these findings of nativist research to naturalism or scientism which, as we have shown using Carruthers as an example, seek to concoct a naturalist revival from empiricism's bitter defeat.

In conclusion, we can say that modern research findings confirm and corroborate the reflections of Plato, Descartes, Leibniz, and Kant, that is, basically, of *rationalism*, while it becomes increasingly obvious that the doctrine of *empiricism* is simply *wrong* also with respect to its second basic dogma.

## 5. Thinking without language

So far, we have discussed the essential conflict issues and arguments in the controversy between rationalism and EAN. Primarily focusing on the field of vision and innate knowledge, we have seen that essential elements and functions of visual perception and thinking are for a considerable part *innate*. We have also seen that the relatively rapid emergence of language about 50,000 years ago marked the end of a period of about 800,000 years where early humans must have successfully thought and acted in a purposively rational manner but without language. Seeking to concretize my approach to the concept of *visual thinking*, I now propose to discuss a

number of highly interesting fields where *visual thinking*, problem solving, or organizing proceeds without recourse to language although the latter is usually, and automatically, seen as *the* prime medium of thinking, if not *identified* with it. Current philosophy tends to tacitly equate thinking with language, an assumption that I propose to challenge and refute. Ernst Cassirer, while noting that "*… language shows itself again and again to be the mighty and indispensable vehicle of thought*," nevertheless did not conceive of the relation between thinking and language as one of *identity:*

"*Though there is undeniably a thinking without words, such thinking always remains far more confined within the particular, within what is given here and now, than is true of linguistic thinking.*"[832]

This description – that "*such thinking always remains far more confined within the particular, within what is given here and now, than is true of linguistic thinking*" – is a very suitable introduction to the subject of thinking without language.

In the following, three fields will be addressed that will allow us to observe visual thinking "in the act." The first of these fields is thinking and problem solving in the deaf since for purely organic reasons, they can never have heard a single word in a spoken language. About fifty years ago, when the studies I propose to discuss in this context were conducted, services for the deaf, e.g. sign language acquisition, were far from being as comprehensively available as they are today. My intention here is not to evaluate their abilities, nor to discuss the issue in purely technical terms. Rather, what I am interested in is the question of *how* problem solving *without language* is possible and what this implies for the relation between *visual thinking*, problem solving, and language in general. Without unduly anticipating, it can be said that the empirical tests, very conscientiously conducted by H.G. Furth, clearly show that on most of the tests, deaf-mute children and adolescents who had to rely on visual thinking alone for problem solving did as well as their "normal" peers.

The second field to be explored in this context is the *game of chess* since it provides a concrete case of highly complex *thinking without language*, a prime example, as it were, of the efficiency, speed, and intuitive ease of visual thinking, i.e. *rational insight*. The third showcase example will, then, be *geometry*. In this field, there is a tradition, going back to Plato, Descartes, and Spinoza, to reflect on or characterize thinking by means of geometrical problem solving ("*more geometrico*") and to take the thought processes thus observed to be paradigmatic of visual cognition and problem solving in general. We have already seen that Descartes strongly relied on the *analytical method* of geometrical problem solving,

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[832] Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 331.

basically adopted from the geometers of antiquity – such as, for example, Euclid – whom he greatly admired. We have also seen that Plato's much-discussed "unwritten doctrine" may basically have consisted of geometrical exercises where students' ways of problem solving were used as a means of observing and analyzing their capacity and method of thinking in general. The "*Meno*" dialogue which we will later discuss at some length may indeed have been the description of such an exercise at Plato's academy. At the same time, and more specifically, mathematics and geometry have been a highly significant element of the rationalist tradition, in contrast to empiricists such as Locke, Hume, and Berkeley who lacked mathematical proficiency and found the cogency of pure thinking in mathematics and geometry disconcerting if not, for some of them, a nuisance, as a quotation from Berkeley has clearly shown. Rationalists, in contrast, have always sought to attain a supreme degree of stringency and precision in their philosophical treatises by conducting them "*more geometrico*," that is, by applying the geometrical method where the argument is step by step developed and made understandable right up to the conclusive Q.E.D., that is, the confirmation that the proof was produced by analytical means. Cases in point are Descartes' *Regulae*, but also Spinoza's 1663 treatise, "The Principles of René Descartes' Philosophy, Demonstrated in Geometrical Order," the only work to be published during his lifetime and his Ethics.[833] Here again, there is a number of very interesting recent approaches, more or less neo-Kantian in spirit, where renewed emphasis is put, in purely methodological terms, on the visual element of geometry. These, too, will later be discussed in more detail.

Another field to be considered is *dreams*, that is, the visual translation of unconscious thoughts into symbolically organized images, or "storylines" of images. The capacity of dreaming arguably dates back to a very early evolutionary stage of brain development and can apparently also be observed in animals. In dreams, stories are told in a succession of images that seem to have the function of symbolically condensing certain experiences, psychological contents, and fantasies, with language playing a marginal role at most. If, for instance, we dream of staring into an abyss because in everyday life, we are facing workplace-related problems, this implies that the threatening situation must have previously been thematized while the image of the abyss must have been "chosen" and metaphorically *understood* as a means of *symbolizing* these threats. Using images to symbolize something, however, is a non-trivial mental act and condensation effort that evidently seems to happen eidetically, i.e. without language. For reasons of space, I cannot go into Freud's *Interpretation of Dreams* here, but I'd like to draw attention to J.F. Pagel's interesting work

[833] Baruch Spinoza, The Principles of René Descartes' Philosophy, Demonstrated in Geometrical Order, Forgotten Books 2018.

on the issue.[834] Pagel starts his scientific investigation of the dream, by noting that when it comes to the methodical study of dreams, it was indeed Descartes who first raised some pertinent questions. Thus, in his diary, Descartes noted: "*Our dreams … represent to us various objects in the same way as our exterior senses do … What truth there is in them (our thoughts) ought infallibly to be found in those we have when awake rather than those we have in our dreams.*"[835] Descartes here refers to the fact that when we are dreaming, our mind, by definition free in its creativity and spontaneity and unhampered by physical laws, goes one step further and starts operating at what seems a completely arbitrary and bizarre level. Pagel, who obviously succeeded in overcoming the mental constraints of EAN, comments on this origin in Descartes (to whose initiating role he dedicates an entire chapter) as follows:

"*For those of us who have come from a cultural standard of belief that brain equals mind, it is difficult to comprehend the possibility that brain may not be mind.*" (loc. cit.)

EAN proponents, in contrast, are diagnosed with a belief in the simple formula of "*mind = brain*" and a "*Cartesian anxiety*":

"*As John Searle (1984) bluntly states, 'brains cause minds.' Yet there is only limited evidence for the functioning of CNS-based neuro-processing systems in mind-based processes such as focused thought, intelligence, associative thought, feeling, creativity and associative visual imagery. Monism is a theory requiring belief. And so many want to believe.*" (loc. cit., p. 179)

What is pinpointed here is, once again, the very type of EAN *belief* that has already been shown to fail with regard to their theory of perception.

Pagel quotes a definition of *dream* (from S. Krippner, 1994) that indeed makes sense: "*Dream – a series of images that occur during sleep … often reported in narrative form.*" Dreams occur in the REM (rapid eye movement) stage of sleep that is essential for rest and relaxation. REM stages are also observed in animals and seem to correlate with brain size. Also, the involvement of the rapid eye movement stage once more highlights the close connection between the motor activity of vision, or saccadic eye movement, and representation. Dreams occur in one's sleep but may also be day dreams, or drug-induced dreams. Secondly – and this is important –, they can later be remembered and, thus, analyzed; and, thirdly, they have a *describable content* (loc. cit., p. 24f.). For my argumentation here, this latter point is the most important one. For these images are figurative representations we spontaneously and unconsciously "create" in

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[834] J.F. Pagel, The limits of Dreams – A Scientific Exploration of the Mind/Brain Interface, Elsevier Academic Press Oxford 2008, p. 3.

[835] J.F. Pagel, The limits of Dreams – A Scientific Exploration of the Mind/Brain Interface, Elsevier Academic Press Oxford 2008, p. 3.

our dreams, they are not a random succession of meaningless shreds of images – a *manifoldness*, or "*rhapsody of perceptions*" (Kant) – but have a "*narrative form*," that is, they tell us something, a story, a content, that has a *meaning*. And according to the psychoanalytical interpretation of dreams, they may be *symptoms* of a hidden psychological condition, figurative *signs* that are "readable," that is, make *sense* without any spoken language.

But whoever is able to narrate a content must have understood the essence, the meaning of the story thus told even though it may simply consist of a series of images. But if the dream operates by condensing a series of images to *symbolize* unconscious fears, for instance, then things get even more complex, since this implies that the unconscious elements of the mind must already have the capacity to not only understand conceptual contents but to express them in a new, *symbolical mode* that, at the same time, serves as a disguise that shields these contents from the self-conscious mind. Thus, while we cannot directly identify the person we dream of as the one we fear, he or she still has attributes that allow us to decode who is who in the story told by the dream; which highlights the fact that a previous *encoding* of thoughts must have taken place – an incredible achievement, considering that we are dealing with such an archaic mental process. I will later return to the fact that the *general image* must already contain elements that are concept-like with respect to their degree of condensation, not unlike what happens in the dream where there is obviously both a meaning and an effort to disguise this meaning by using symbols to express it. Again, the close connection between eye movement, image, archaic initial thought processes and, most clearly, concept-like *functional achievements* is obvious long *before a language-based concept* can have existed at all. What we have here is *visual thinking* without language, an incredible achievement of the mind since *without concepts*, it successfully, and all at once, condenses, symbolizes, and masks "contents" and connections. So much for various reflections on "thinking without language," all of which serve my purpose of methodically differentiating between *visual thinking* and *language-based thinking* and laying claim to its independent place in philosophy.

## Visual thinking in the deaf

In the following, I will primarily focus on the interesting empirical tests conducted, in the 1960s, by Hans G. Furth, an émigré to the USA. As a scientist, Furth was primarily concerned with the respect, well-being, non-discrimination of deaf people, then still called "deaf-mutes." This concern, however, led on to a fundamental philosophical question that became the broad framework of his later publications. Having observed,

during his intense work with deaf children and adolescents, that their problem solving tended to be slower, more hesitant, and more introvert than that of their "normal" peers, he asked himself "*what do they think* in" when there was no spoken mother tongue for them to rely on. Also, at the time, that is, when linguistic philosophy ruled supreme, Furth was convinced that language alone could never suffice to fully account for human thinking. In the preface to the German translation of his very interesting book, "*Thinking without Language*" ("Denkprozesse ohne Sprache," Düsseldorf 1972), he notes (on p. 20):

"*For humanity and intelligence stem from much deeper sources than those of the limited structure of human language*."

Consequently, he started to conduct scientific studies comparing deaf children and adolescents with their "normal" peers and, at the same time, began to cooperate with other experts to develop tests that would make it "*possible to separate the two phenomena*" [i.e. language and thinking] "*and study thinking without language.*"[836] Furth thought of himself as a scientist doing empirical research, but he was also familiar with the concepts of *gestalt theory* and sought to position himself between the poles of the language dogma of the early 1960s and gestalt theory which he had come to know during his time in Germany.[837] He was also influenced by Noam Chomsky's studies, groundbreaking at the time, on the deep structure of language:

"*Chomsky (1962) made the rather bold assertion that a formal model of language should provide rules and principles by which any correct utterance of a particular language could be generated and he further hypothesized that such a generative model may well coincide with what implicitly takes place in a person competent in a language. With this suggestion Chomsky places himself on the side of those who seek a model of thinking not based on language. Necessarily, there is one body of knowledge we do not acquire by means of language and that is competence in natural language, achieved by practically all human beings by the age of four. For psychologists, perhaps the most pertinent of Chomsky's ideas relates to his theory on levels of structure and transformational rules.*"[838]

Thus, Furth's experiments were also partly inspired by Chomsky's then rather novel ideas. In his book, Furth first *defines* what is to be understood by *deaf people*, that is, people "*whose hearing loss prevents … auditory contact with the world around them, and has done so either from birth or since before the acquisition of language*" (loc. cit., p. 7). He also explains

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836 Hans G. Furth, Thinking Without Language, The Free Press, New York 1968, p. 5.

837 See, among others: Hans G. Furth and Ruben A. Mendez, The Influence of Language and Age on Gestalt Laws of Perception, The American Journal of Psychology, Vol. 76, No. 1 (Mar., 1963), pp. 74–81.

838 Hans G. Furth, Thinking Without Language, The Free Press, New York 1968, p. 52.

why the former term of "deaf-mute" should not be used since this would imply that deaf people who through no fault of their own had been born hearing-impaired had the additional plague of being mute. As it is, schools for the deaf are a rather recent achievement, inspired by the French Revolution and its Enlightenment "*reason.*" With time, a standardized sign language (in the USA: American Sign Language, ASL) was developed that proved to be a very good means of communication. In terms of my purpose here it should be noted that sign language is a form of *visual* language that needs to be *seen* and *made visible* by gestures and facial expressions. So, since by its very nature it differs from *spoken* language, it takes the ground from under any arguments bent on suggesting that deaf people had some kind of "language," after all. As Jonathan Ree quite rightly explains in his philosophical history of the deaf, "*I See a Voice*":

"*According to Valade, the fact that sign syntax depended on spatial as well as temporal ordering – on the principle of the 'double construction' of sign language as he called it – was a necessary consequence of the fact that signs are exclusively visual. Vision, he argued, is essentially spatial and therefore plural: we can look at an animated scene, and see different processes all happening at the same time or moving between different positions within it. Sign language exploited the phenomenon of visible local simultaneity, and speech itself displayed the same features when observed by the eye rather than the ear: those who relied on 'lip reading' were obliged to follow the separate actions of throat, tongue, teeth and lips all at the same time in order to guess at what was being said. But when speech is perceived by the ears of those who can hear, then it takes the form of a single stream of sound which, though infinitely variable, remains 'simple in all its varieties'. The faculty of hearing spins its objects together into a single one-dimensional thread of sound, and it was the special privilege of speech to take advantage of this facility. Signs, on the other hand, could only generate a proliferating multitude of visual experiences…*"[839]

This statement illustrates the fundamental difference between a spoken language and a language that is *seen in space*, i.e. that is a "*double construction*" that operates at more than one level. Here, facial expressions and gestures need to be added to the sources of visual information. Also, the ability to read is significantly restricted in deaf people, as Furth explains with reference to certain findings:

"*The results, showing that between the ages of 10 and 16 the deaf on the average did not advance even one full grade in reading ability, confirm what is common knowledge to anyone working with the deaf whether here or abroad. The profoundly deaf person who has been so since before the age of language learning may know quite a number of isolated words, but with rare exceptions will he be able to form or comprehend sentences or paragraphs which approximate the complexity of Grade 4 reading level.*

[839] Jonathan Ree, I See a Voice, Flamingo HarperCollins Publishers, London 2000, p. 305f.

*The linguistic deficiency of the deaf consists more precisely in their inability to handle linguistic ordering or structure*." (loc. cit., p. 14)

This clarification is important, for some may want to respond to Furth's findings by trying to "undermine" them, that is, challenge the methodology, claim that thinking in deaf people is nevertheless language-based, that they may have learned some words before they became deaf, etc. However, Furth's studies were very carefully designed and conducted so as to precisely avoid providing a target for this kind of objections which, at a time when behaviorism and philosophy of language ruled supreme, are likely to have been much more aggressive. Also, after the publication of Furth's book, his studies and their findings have been corroborated many times over. For reasons of space, Furth's experiments cannot be described in every detail here, but in terms of method, they were definitely beyond reproach.

Furth gave comprehensive thought to his methodology and cooperated with leading US psychologists and cognitive scientists to develop useful and appropriate approaches and techniques for studying this novel issue. The main problem was how to measure cognitive abilities that were not language-based when existing intelligence tests primarily used linguistic questions and tasks. In the end, Furth opted for so-called transfer-type tests: subjects were first presented with a very simple task that could be explained by pointing; if they were able to solve the task, they were given another task that was of the same type but structurally more complex or otherwise modified. Thus, the experimenter could see from the start whether or not the task had been understood while, at the same time, motivational problems could be bypassed. Cognitive capacities were tested in five domains: *concept discovery and control*; *memory and perception*; *Piaget-type tests of conservation*; *logical classification*; *verbal mediation*. Whenever proven test procedures required the use of language, they were reframed as visual problems and sequences. The first experiment was designed to test *sameness*, *symmetry*, and *opposition*. When testing *opposition*, for instance, subjects were shown cards with objects from the smallest to the largest, and when the examiner pointed to the largest one, the test person was required to respond by pointing to the smallest one, etc. Then cards with symmetrical and non-symmetrical objects were used, and if the simple tasks had been understood and solved, colors, forms, arrangements, etc. were introduced to make the principles more complex. Only educable children were tested, whereas children with massive visual, auditive, or motor impairments were excluded. Test groups were age groups (7 to 12 years of age), with 30 subjects in each age group.

In the first series of tests, results were mixed: deaf children did as well as same-aged speaking school children in the sameness and symmetry tasks but less well in the opposition tasks. Hans Furth attributed this

finding to the fact that oppositions such as "small-large" or "cold-hot" were probably easier to internalize in a language-based context than in the visual world of the deaf. Next, similarity tests were administered. Here, two groups were used, one with children at about eight years of age, the other one with 16-year old school children. Results showed that in the younger age group, the deaf children did less well than their peers while in the older group they did as well. This suggests that by adolescence, developmental retardations that may have existed in the younger deaf have been overcome. This tendency was also evident in the concept discovery and control tests: the older the deaf children, the less they differed from their "normal" peers.

In a second series, gestalt perception capabilities were tested, that is, proximity, closure, good form, and similarity, using examples from gestalt theory. Here, no significant differences were found between groups; differences were only found for specific tasks:

"*More of the sixteen-year-old deaf group recognized the letter than did the hearing subjects of the same age, while, for the geometrical figure, the younger deaf surpassed the hearing in drawing the* Gestalt." (loc. cit., p. 108)

Thus, no between-groups differences were found for gestalt perception, while certain within-group differences were due to the fact that the deaf children outperformed their hearing peers. Further experiments used Piaget-type tasks such as conservation of weight and conservation of amount of liquid; tasks in logical classification, using cards with various symbols, colors, forms, and arrangements; tasks in conceptual performance and use of logical symbols. Interestingly, while the hearing did better in some tasks, no significant differences between deaf subjects and the control group were found in the tests for symbol discovery and use of logical symbols, even though they were far from trivial. This means that in non-trivial logic tests, deaf school children who did not have language performed as well as their "normal" peers, which is a remarkable finding that of course gives rise to a number of questions.

Introducing some additional qualitative observations, Furth first sought to make sense of these findings by linking them to considerations about how thinking may occur in the deaf:

"*The deaf are often insecure in an unstructured situation of intellectual discovery and are accordingly slow in seeing what may be more readily obvious to the hearing peer. I have not found that the deaf were incapable of understanding or of applying a principle as well as the hearing, once it was understood. But in some cases the deaf find it hard to discover the basis or reason for thinking.*" (loc. cit.)

A further observation pertains to another aspect – besides "slowness" – of the thinking behavior of the deaf, namely a certain lack of flexibility:

"*The deaf have often been called 'rigid' with regard to their thinking. Their inability or slowness in shifting from one principle or viewpoint to another has frequently been noted. Such slowness in shifting has been linked to the linguistic deficiency of the deaf and some resultant 'concrete' attitude which is supposed to be related to or accounted for by a common source.*" (loc. cit., p. 147)

This observation, too, is interesting insofar as it would seem to indicate the difficulties faced by a population who has to act but cannot rely on language to do so, i.e. has to learn procedures from observation and has no subjunctive, no way of expressing options and possibilities, no linguistic abstractions. Having reviewed the findings, Furth then starts to discuss the philosophical core of this interesting question:

"*A common reaction to the evidence for a normal intellectual development in the language-deficient deaf is the question: 'If they do think, what do they think* in*?' This question betrays the questioner's theoretical outlook on thinking and language. Deaf people's intelligence can obviously not be explained as due to language, but, as we also see, neither can language explain the intelligent behavior of the hearing. If this question is reinterpreted to ask what types of symbols deaf people create for themselves, we are free to speculate about visual, kinesthetic, and gestural symbols. At the same time we realize that a good part of a hearing child's intellectual growth is also more readily revealed in nonverbal than in verbal symbolism.*" (loc. cit., p. 198)

Thus, the crucial question has been raised: "*If they do think, what do they think* in*?*"! Which is also the crucial question for our present investigation. If there is no language and no rule-based, linguistical-conceptual system of symbols in the thinking of the deaf, no concept, only vision, *what* do deaf children think *in* when they do as well as their hearing peers on certain logical tasks? There must be something between concept and intuition – these "extremes" in Kant's epistemology –, something that thinks, or an *understanding of function*, that is, a form of visual thinking attuned to these functional connections and relations, these sequences, similarities, symmetries, oppositions, etc. These reflections serve as a guideline for Furth's further discussion of the findings of his experiments, for while language surely is the most important and most powerful instrument thinking has created for itself, it *is not* thinking itself:

"*In this sense mature use of language is the crown of the building, not its foundation. For that reason language cannot be the means by which skills prerequisite to linguistic competence and use are to be explained.*" (loc. cit., p. 200)

In his final discussion, Hans Furth draws two key conclusions from his findings. The first one is:

"*It follows that a relation between language and operational thinking is not essential and is not specifically required during the developmental stage. Some symbols are required during the representational phase of thinking and to set the stage for operational thinking, i.e., to communicate and recognize the symbolized elements of a*

*problem. The experimental evidence from linguistically incompetent deaf persons confirms the theoretical postulation for the non-necessity of language.*" (loc. cit., p. 226)

The second conclusion confirms this insight but offers some additional "thought-provoking ideas":

"*As a final conclusion, the major significance of the reported findings for theories of thinking is the demonstration that logical, intelligent thinking does not need the support of a symbolic system, as it exists in the living language of society. Thinking is undoubtedly an internal system, a hierarchical ordering within the person of his interaction with the world. The symbol system of language mirrors and in a certain way expresses that internal organization. However, the internal organization of intelligence is not dependent on the language System: on the contrary, comprehension and use of the readymade language is dependent on the structure of intelligence.*

*One would not be justified in asserting that the deaf children who were tested in this study had a symbolic system available to them. Most of them were unfamiliar with the verbal language of society and only poorly acquainted with the manual sign language. Yet, they succeeded on tasks of thinking and quite likely produced symbols if and when they were needed. Whatever system or intellectual ordering of experience was manifest in their behavior was entirely due to their internal structure of thinking and could not conceivably be ascribed to a non-existing symbolic system.*

*If then the thinking processes of the deaf can and must be explained without recourse to language, a nonverbal approach to thinking may be a fruitful one for studying thinking in general.*"[840]

Thus, Hans Furth's conclusions are as follows: it could be empirically shown that on logical tests, deaf children – who, at the time, may also have been suffering from neglect – did on the whole as well as same-aged hearing school children. For the sake of accuracy, a critical note seems in order here: evidently, the tasks used were visual in nature, that is, the tests were conducted in a field where the deaf were able to keep up. After all, it wouldn't have made much sense to have them compete in tests involving abstract concepts. But be that as it may, they were obviously at a par with their peers in fields that required complex logical thinking, and they solved the tasks and delivered the performance *without language*. This leads Furth to conclude that there must be thinking without language and that while language may be "the crown of the building" of nature, thinking per se must be evolutionarily earlier as well as more archaic. Now, from my present point of view, it is interesting that Furth does acknowledge this fact as a result of his empirical tests with the deaf but still remains rather vague and seems to be clueless when it comes to describing this faculty of thinking more closely. Thus, he writes: "*Thinking is undoubtedly an internal system, a hierarchical ordering within the person of his interaction with the world. The symbol system of language mirrors and*

[840] Hans G. Furth, Thinking Without Language, The Free Press, New York 1968, p. 228.

*in a certain way expresses that internal organization.*" This can be understood as saying that there is an internal system, a hierarchical ordering system or *internal organization* of thinking that precedes language and is in some way expressed by language.

In my view, the interesting point here is the term of "*internal organization*," which is suggestive of the laws of *gestalt* as described in some detail in the chapter on *vision science*. In the context of vision, we could show that the laws of gestalt are corroborated by modern neuroinformatics, and Furth here offers a similar argumentation. The deaf think without language – "*what do they think* in?" Well, obviously, it must be an organizational form of thinking that can be adequately described as *visual thinking*. We have by now been repeatedly brought to realize that the *laws of gestalt* are the basic *organizational form* of our perceptual system and that *visual thinking* may have developed from this perceptual faculty. The case of the deaf provides us with a model where the physiological impossibility of language acquisition attests to the fact that the deaf must and *can* solve tasks by visual thinking alone, and in their very own way. Which means that we have another hot lead on our way toward *visual thinking*.

## Visual thinking in the game of chess

Let's now imagine two situations. Walking in a park in summer, you see two experienced chess players sitting at a table and playing so-called "blitz chess," where chess clocks are used. A group of kibitzers stands by, silently watching the game. Blitz chess rules state that the entire match must be played within a time limit of five minutes for each player, so each player's clock is set to exactly five minutes. All in all, since there are two players, each with a five-minute time limit, such a game can take ten minutes at most. But the playing time may also be reduced to three minutes, and so-called bullet chess is even played with a mere one-minute time limit for each player for the entire game. The game is won when one of the players succeeds in checkmating her opponent or in engineering a winning position that is so inescapable that the opponent resigns (because he knows that the remaining time will suffice for her to technically checkmate him), or when the opponent's time limit elapses. It's easy to see that with so extremely short a time limit – e.g. three minutes – and an average of around 50 moves per game there are only very few seconds in which to keep an eye on the chessboard, evaluate and figure out the purpose of the opponent's last move, contemplate a countermove, calculate its consequences, realize that it won't work, contemplate another move, calculate the consequences of this second move, evaluate the position that will result from the combination, opt for the move, perform the move physically, and hit one's clock to set off the opponent's clock. At some stages

of the game, especially during the last minutes when *zeitnot* sets in and proceedings can get very frantic, highly complex moves must be performed lightning-fast, virtually reciprocally and simultaneously. Anybody pretending that he or she thinks in *linguistic* terms in this situation – by imperceptible vibrations of their larynx or the rapid sotto-voce voicing of a series of sentences, the written text of which would fill a whole page for each second of thinking – is either a liar or an apologist of analytic philosophy of language.

The second situation is as follows: in the adjoining room of a large hall, a chess master is seated. He cannot see what is going on in the hall where about 30 or 40 chess players, each of them with their own board, are placed at a u-shaped table (the current world record is 46 players, with the chess master winning 25 and losing 2 games, with 19 games ending in a draw[841]). The chess master will play all the 40 players at the same time, that is, *simultaneously* and sometimes *blindfolded*. He communicates his moves to an intermediary (or enters them on an empty board on a display) who, in turn, communicates them to the players, proceeding from board 1 to board 2, and so on. Each player must, then, perform their own move, which is communicated to the grandmaster by the intermediary, and so on, up to board 40. At these events, the players at the boards aren't top players, it is true, but the performance of the chess master still defies the imagination. He must, first, remember the positions on all the 40 boards, one by one, since otherwise he would lose track and would no longer be able to tailor his own move to the respective board. While the normal chess player can visualize the changes on the board he is sitting at, the master who is playing simultaneously and blindfolded must not only visualize the current position of 40 boards but also "calculate" on them! Furthermore, he must not confuse the boards, which would result in his losing a game. And he must remember the boards in the correct order and in every move because otherwise, he would not be able to start his own calculations on each board. He then does his calculations in his imagination, with the additional challenge that in order to win the game, he must find the combinations that will allow him to outplay the opponent. As players start to resign, he must remember which boards can be "deleted" and which boards he still needs to play. Some games may take more than 70 moves, which means that to win them, he must be able to concentrate for hours on end. Anybody pretending that the chess master does all this without resorting to *figurative imagination* in his deliberations and doing *visual thinking* on the imagined boards, is either naïve or a blockheaded behaviorist.

[841] http://www.blindsimultan.de/index.php/facts-zum-weltrekord (2.1.2016).

But let's start from the beginning and try to figure out how the perception of the chess board and the chess pieces, the individual moves and combinations works and what thought processes may be involved. Precisely what, in a positivist sense, do we "see" in a game of chess? A chess board, consisting of 32 light and 32 dark squares on an 8 x 8 grid. On the board, there are 16 white and 16 black pieces, usually made of wood or plastic, and arranged in the classical initial position. Apart from that, in terms of sacrosanct *sense experience*, we *see* ... nothing. Everything else, the very essence of the game, is "*only*" imagined and "*only*" thought. For the *pieces* have certain *qualities*, *patterns of movement*, and *functions* that necessarily lead to a certain course of action and certain logical series, and we have repeatedly seen that the *function* of a thing can always only be thought and never be seen, as Plato was the first to rightly observe. But *how* does one think in chess? This is an interesting question that has meanwhile given rise to a considerable amount of literature. Historically, the most widely known works on this matter are the studies of the famous French neurologist Alfred Binet late in the 19th century,[842] and those of the American Alfred A. Cleveland at the beginning of the 20th century.[843] Other important studies followed in the 1920s and 1930s, primarily focusing on the way of thinking of the world champions and leading grandmasters to find out in what way they differ from the average chess player.

These studies already allow us to single out some typical qualities and abilities. For one thing, there was, of course, the ability to *calculate* combinations and processes with more foresight and precision than the average player. But, and this is a point often underappreciated by the lay person, they were also *more able to assess existing positions* and weigh the risks and benefits of various potential positions. Just bear in mind that after a few moves, the number of possibilities in chess is already as great as that of the stars in the known universe – many quintillions. This means that as often as not, you cannot calculate a series of moves or a combination to the very end, e.g. checkmate; rather, as soon as you have calculated a combination, you are again faced with a new position on the imaginary, and imagined, chessboard, that again requires you to evaluate it as to whether your own position has become better or worse in the process. This means that what is crucial here is not only the ability to calculate variants and their potential implications as precisely and as far ahead as possible but also the superior ability to evaluate the position you will face *after* the combination. But *how* to evaluate the resulting position without again having to calculate, say, the next 7 moves after a 5-move combina-

842 Alfred Binet, Psychologie des grands calculateurs et joueurs d'échecs, Paris 1894.

843 Alfred A. Cleveland, The psychology of chess and of learning to play it, The American Journal of Psychology, XVIII, 269–308, 1907.

tion, and so on, ad infinitum? Here, thinking in *organized patterns* comes into play, certain constellations and formations that entail certain risks and benefits, dead ends and new openings. Once one understands, and has learned to apply in practice, the *functionality* of these typical positions and series of moves, one's play will get better as well as faster because what goes on now is no longer the beginner's tentative steps but a series of applied motives and *functional patterns*. Not unlike fencing, where certain feints and standard attacks are internalized and subsequently applied as sequences, the calculation effort in chess, too, can be facilitated by the knowledge of certain standard procedures and types of position. The former world chess champion Capablanca once said: "*They think, I know!*" or something to that effect. What he meant is precisely this: success in chess is not only about "calculating" variants even though ultimately this is decisive, of course; it is also about an understanding of positions and a repertory of motives, patterns, and stratagems; a fact that is also confirmed by Kounios and Beeman:

"*Instead of outcomputing their opponents, Grandmasters win by being better at recognizing patterns that emerge during a game. Their vast experience and memory for games they've played and analyzed tells them which avenues are promising and which are dead ends that can be ignored so they don't have to figure out all the possible consequences of all the possible moves. This is how experts get better results by thinking less, not more.*

*Research supports this view of expertise in chess and beyond. Expert chess players remember meaningful chess positions better than players who aren't experts; but, surprisingly, experts don't remember random or nonsensical positions significantly better than nonexperts. This is because meaningful patters serve as a kind of shorthand that's easier to remember than a meaningless configuration of pieces that couldn't occur in a real game*."[844]

Interestingly, Kounios and Beeman, too, refer to examples of the above-quoted world champion of the 1920, Jose Capablanca, in their book.

Let's for a moment reflect on what the insights just gained imply for the issue of *visual thinking*. How does one proceed when appreciating and assessing a position that results from a 5-move combination, for instance? You first need to "*calculate*," in your head, the variants and combinations, which is already a rather challenging task if you don't want to "overlook" anything. You may, of course, start out with language-based reasoning such as, for instance: "… I need to protect the queenside and, to this end, trade the dark bishop. This can be achieved by moving the knight and threatening the opponent's queen, but no, I can't do this because …" But soon, language-based thinking will break off and you will revert to what chess players call "*taking a look into the position*" until you "*see*" the de-

[844] John Kounios, Mark Beeman, The Eureka Factor: Creative Insights and the Brain, London, Windmill Books, 2016, p. 48.

sired move that can serve your tactical purpose. This means that when "*calculating*" the combinations, which, of course, is nothing in the way of calculating with numbers, one enters a mode of *visual imagination*, one moves in a world defined by the *power of imagination*, sometimes uttering fragments of speech which, however, must not interfere with visual thinking: "hop – takes – takes back – takes again – and mate" The result may, then, again be couched in linguistic terms such as, for instance: "ok, this will win me one more pawn and one more exchange." The core stages of combinatorial calculation, however, happen in the imagination and in a purely *visual* mode, without language-based thinking. The assessment of a position, too, may at first be done in linguistic terms: "Mmh, blacks position is very precarious, particularly in the center…", but then one starts to get engrossed in the position, "*sees*" pawn structures, "hanging" pawns, knight forks, open lines, and the king's endangered position. The longer you "look into" the position, the more language-based thinking fades into the background, stillness spreads around you, the minutes pass without your being aware of it, and you move in an archaic world of *pure visual thinking*. For "*seeing*" all these qualities and functions of the pieces as well as the position here means that grasping, thinking, and processing them happens *visually*, not linguistically; and this – as we have time and again made clear – is not about "*seeing*" in terms of the *visual image*, the much-referred-to *sense impressions* on the retina, but in terms of *imagination* and *visual thinking* since, after all, the pieces and the board and the "*sense impressions*" they convey do not change, and positions are just as they were before you started contemplating them.

In his study "*Das Problem von Sprache und Denken*," which is more or less committed to analytic linguistic philosophy, Gottfried Seebaß was led to a similar conclusion:

"*A person solving a chess problem is unlikely to do so by means of an unbroken stream of 'inner speech:' he 'sees' the constellation of the initial position, 'imagines' changed positions, explores the moves that lead up to as well as depart from them, and thus gains a more and more differentiated 'picture' of the possible moves that will eventually allow him to solve the problem. (…) The transition from the non-linguistic to the linguistic stages and vice versa happens imperceptibly.*"[845]

This description is consistent with my own observations and helps to further clarify the crucial points. What is decisive, first of all, is the statement that solving the problem does not happen in the mode of an "*unbroken stream of 'inner speech,'*" for if this is not so, then the intermediate sequences of thinking must be non-linguistic, that is, *visual*. Seebaß does not explore how and by what rules this is possible. But as soon as a single

[845] Gottfried Seebaß, Das Problem von Sprache und Denken, Frankfurt/M. 1981, p. 312.

case of non-linguistic thinking has been ascertained, the thesis that all thinking has to be purely linguistic is invalidated. Seebaß, then, says that the transition between linguistic and visual thinking *happens imperceptibly*. This supports my thesis that we have an earlier visual and a later linguistic-abstract ability to think, that these systems complement each other, and that they are used according to what best serves a specific purpose.

In his interesting study, "*Schachpsychologie*," Reinhard Munzert discusses various studies in this field and also refers to the work of Binet, the famous French neurologist. Binet was interested in the question of *how* the pieces and the board are seen and remembered with the "eyes of the mind." Munzert describes Binet's studies, who quotes one of the best German players of all times (Siegbert Tarrasch):

"*In the course of the game, how are the pieces symbolized (represented) and moved in the eyes of the mind? Are the pieces imagined or reproduced photograph-like, or perhaps even seen on a real board? Binet found that for a majority of players of blindfold chess, the figurative representation was more or less blurred or abstract. Tarrasch described this as follows: 'I imagine a rather small chessboard (about 8 x 8 cm). Thus, I can see the whole board at a glance, and my mind's eyes can rapidly switch between squares. I don't see the squares as distinctly black or distinctly white but only as darker or lighter. The difference in color between the white and the black pieces is even less pronounced; I rather perceive them in terms of friends or enemies. The form of the pieces remains very vague. I rather see them as incorporations of certain actions (possible moves; R.M.).' (quoted from Binet 1893/1966, p. 160).*"[846]

Tarrasch's description is remarkable insofar as he says that he *imagines* both the small chessboard and the *squares* not in every detail but as darker or lighter, and that "*the form of the pieces remains very vague.*" For, firstly, Tarrasch confirms what I have already described, namely that this clearly is about *visual imagining*, not propositions; secondly, the entire passage is strongly reminiscent of *Stephen Kosslyn's* reflections on the *imagination* in his chapter on vision. Due to their origin in the visual organs and, thus, saccadic eye movement, the time for images to be retained in the imagination is very short, which means that they are necessarily vague and require permanent "re-uploading." Furthermore, Tarrasch describes the very mode of representation that contradicts Hume's and Berkeley's theory of abstraction, for we do not see the exact reproductions of concrete, individual pieces; rather, what we "see" with the eyes of the mind is their functionality as "*incorporations of certain actions*." This was also the very argument that Russell advanced against Hume, namely that one may well have a universal representation of, for instance, a geometrical figure precisely because the latter is not reproduced *exactly* and individually but vaguely and, at the same time, in its *functionality*, that is, its universal

[846] Reinhard Munzert, Schachpsychologie, Hollfeld 1989, p. 196.

traits. In short, what happens in chess clearly is visual thought processes that go on in parallel with language-based thinking and may at times be relegated to the background but, at others, entirely dominate the consciousness.

In the mid-20th century, Adrian De Groot conducted interesting experiments – already referred to above – with world champions and Grandmasters, asking them to linguistically express what crossed their minds when contemplating a somewhat intricate middlegame position he had selected for the purpose. He asked them to put their reflections into words or, rather, speak along with their visual thinking, and recorded these commentaries. This technique is very instructive since one at once realizes how absolutely overcharged and deficient language-based thinking is in the face of the massive effort in visual thinking that is required in the game of chess. I once tried to write down my own thoughts for a very small number of moves during such a game; an undertaking that is doomed to fail, if only because – and therefore De Groot's experiments are just the peak of the iceberg – there are dozens, if not hundreds, of details for each position that are unconsciously registered within seconds but defy conscious verbalization: here a line may open, there is an awkward formation of three pawns, there a dark field is weak but could be occupied if this and that would change, the bishop is in a questionable position but I must keep an eye on the queen for the black knight could be moved for a double attack… etc. But these are just the first fleeting thoughts, and the better one gets as a player the greater their number becomes because one "sees" so much more than a beginner who tends to focus on the pieces rather than the important squares, constellations of pawns, lines, etc. If this description was concretely done with a voice recorder, the transcription of a single move including the evaluation of the position, the search for the optimal move, the calculation of combinations and strategic options, the assessment of one's opponent's intentions, the concrete possibilities, and many more such details would easily fill five DIN A4 pages, or almost an entire book for a single game; which would, of course, be absurd. Moreover, one always "sees" more details than one records in language, or writing, a fact that is obvious even when one simply looks at and describes a landscape.

Let's now take a look at De Groot's recordings of the commentaries given by the Grandmasters with respect to the chosen position. I will, first, discuss an example that Munzert quotes from De Groot's book and, then, another example taken directly from De Groot. Munzert chose the protocol of Paul Keres, an Estonian-Soviet Grandmaster and one of the world's top players in the 1950s:

"*First let's have a look at the position. Well, it* is *quite a position! Who is actually better off? Difficult.*

*Let's first have a look at what can be taken; are there any immediate attacks? 1. B-R6 and 2. NxBP – not sufficient. 1. NxB, maybe? He must take back with the Pawn; with the Rook costs a Pawn, and with the Queen will not be possible either – indeed – so 1. NxB, PxN; 2. BxN/5, BPxB; 3. Q-B3. Pooh! That seems to win a piece (Pause). The Pawn on QN2 is attacked. Immediately 1. BxN/5 maybe? Nothing special. Let's calculate it though: …*"[847]

For our purpose, what is interesting in this protocol is not the solution of the combinatorial problem and the rapid identification of the optimal move by the Grandmaster but the way this process of reflection is documented in the text. Thus, he starts his considerations with the words: "*Let's first have a look at what can be taken; are there any immediate attacks? 1. B-R6 and 2. NxBP – not sufficient.*" This is rapidly verbalized in a single sentence. But the two attack variants alone already imply a considerable underlying combinatorial effort, namely the pre-calculation of at least two or three moves ahead as well as of some variants, all of which is done in the time the Grandmaster needed to take a few "looks," grasp and evaluate the outcome and, all at once, reject it as insufficient. During the few seconds of reflection that led to the rejection of these two variants he needed to consider at least fifty, if not more, possible moves or individual steps before coming to his conclusion. All these steps do not appear in the short sentence. This means that considerable *visual thinking* must have gone on that he himself wasn't even aware of, and this is just the beginning of his reflections! Things then become even more intricate, and what the Grandmaster put on record is just a tiny fraction of all the thoughts, evaluations, combinations that were "only" visually calculated and thought through but not linguistically expressed. In my view, this is what follows from the discrepancy between the obviously complex, visually thought combinations and the sparse – from a purely linguistic perspective –, if not crude ("*Pooh!*"), content of the text. In the second example, from the American chess master Raymond Weinstein whose reflections De Groot had recorded later, in 1961, this is even more obvious because unlike Keres, Weinstein expresses himself in colloquial English:

"*Well, I see my Queen isn't en prise anyway. Ah, yeah, diagonal is closed. 1. B–R6 puts the, ah, Rook in an odd position. Let's see. 1. Q.–R3 – there's a move, but ah, might have some Q–R4 possibilities. My NP is en prise – got to watch die NP – yeah the NP is important. However, 1. Bx... 1. BxN/5, NxB; 2. NxN, wins a piece. 1. BxN/5, BxB; 2. NxB. Ah wait a second, wait a second – there's some sort of, ah, some sort of idea there: 1. Bx N/5, BxB; 2. NxB, PxN. I play 1. Bx N/5 – I don't see it all,*

[847] Reinhard Munzert, Schachpsychologie, Hollfeld 1989, p. 203f.; English quotation from Adriaan de Groot, Thought and Choice in Chess, Amsterdam Academic Archive, Amsterdam University Press 2008 (1978), p. 409.

*but I see that 1. BxN/5…Oh, wait a second, there's another possibility…hmmm…yes, there's still another possibility…*"[848]

This text particularly clearly shows how much the chess master must have seen on the board and how little of all these visual reflections, combinations, constellations, connections that must have gone on in his mind came to be linguistically expressed and recorded. This discrepancy, particularly noticeable in so fundamentally visual a game as chess, shows that language-based thinking is essentially insufficient, if not virtually impossible, to enable successful action.

Now, notwithstanding the obvious insufficiency of language for thinking in chess, there may of course be "die-hard" EAN proponents ready to trump up objections, for one should never forget EAN's second strategy: always undermine and attack rationalism even though one's own arguments are rundown and insufficient! They could still object that there is no proof, after all, that these visual trains of thought are not imperceptibly accompanied by "silent inner speech;" i.e. that in some way or another, as the "larynx vibration" theory suggests, this combinatorial reasoning does rely on language, after all. I am, of course, prepared for this type of objections which, I am pleased to say, allow me to now, and as a conclusion, proceed to blitz chess. Blitz chess is an interesting variant of normal chess, with the entire game being reduced to a time limit of five minutes per player, if not, for some variants, three or even one minute. The other rules have already been described at the beginning of my discussion of chess: the game is won when one of the players succeeds in checkmating his opponent or in reaching such an clear winning position that the other player resigns (knowing that the remaining time will suffice for his opponent to technically checkmate him); or if, in the heat of the game, one of the players overlooks a checkmate, which enables the opponent to claim victory. Even a layperson can imagine how extremely limited the time for thinking is when time begins to press, mostly during the endgame when only a few pieces are left and one needs to virtually play move upon move. There are literally only fractions of seconds in which to calculate complicated combinations, simultaneously "see" risks and chances of winning, keep an eye on the chess clock, and move one's pieces. The result is a spectacle (which can be watched in a "live" video on YouTube) where the two players smack their pieces on the board, don't say a word, and act by visual thinking alone. In this situation, only a "die-hard" EAN proponent would try to document and tape all his thoughts. I strongly feel that no practical "experience" will ever fail so grandiosely as this one. For in this case, there is no way for him to verbalize his thoughts within

[848] Adriaan de Groot, Thought and Choice in Chess, Amsterdam Academic Archive, Amsterdam University Press 2008 (1978), p. 415.

the given time limit, since in actual fact, it would take many a page for him to just describe or figure out the basics, and many hours to linguistically think, drone out, and tape it all. This is quite clearly a domain of *visual thinking* where language is absolutely insufficient, or downright inadequate – an incontrovertible case of lightning-fast visual thinking without language!

As a conclusion to this chapter, I'd like to offer some reflections on the *visual* dimension of thinking in chess as compared to the calculations carried out by computer programs. Interestingly, and not unlike what we will see happening in the geometry-mathematics relation, a once purely visual domain will be first broken down into and, then, re-formulated as an algebraic-algorithmic one. For the human chess player sees the position on the chessboard and uses his imagination to think things through, in line with the patterns and gestalts and according to the rules and strategic laws he has learned. A chess program, in contrast, is a curious mix of technology and human coding. First, we should never forget that everything the chess program does has been defined and structured by the programmer's human mind. The software, or the processors, explore the hierarchic structure of the variants at high speed and great search depth but are unable, due to the almost inexhaustible number of moves and variants, to calculate the game to the very end. And that's a good thing, too, for otherwise there would be a known optimal winning variation and the game would become meaningless in its current form. So, pure computing, based on the calculations and evaluations of positions programmed by humans, will allow the computer to reach a certain depth but not go beyond it.

Now, regarding the visual-turn debate, the interesting point here is that in the world of the chess program, or in a game with two computer programs playing against each other, the game of chess is actually completely "algebraized," that is, the squares, pieces, moves, positions have been completely resolved into numbers or signs and have lost their concrete, visual character. Of course, there are monitors where the moves of the two computers that play against each other can be visualized and the human observers can "see" what is going on, but, basically, the game has lost its visual character. No beautiful wooden board, no elaborately carved pieces, no elegant hand movements, no propped-up heads, no chess clocks – only digitalized numerical sequences and signs that reel off in a grey box, a process similar to what happened when geometry was "translated" into algebra, vector calculus, etc. Now, are we to conclude from this that visual thinking and, subsequently, the visual, concrete, hands-on life of humans can be completely digitalized, just as in chess and geometry, and that in the future only computers will play against each other? This takes us to an interesting crossroad in the history of mankind which has already

been discussed at some length in other contexts, primarily in the debate about post-modernism, the new media, and the alleged "death" or "disappearance of the subject," about simulation, superficial pictorial worlds, superimposed structureless slides, etc., and by thinkers such as Jean Baudrillard, Jean-François Lyotard, Paul Virilio, Jacques Derrida, and many more.[849]

Incidentally, there is another interesting link between the two last chapters, i.e. *thinking without language* in the deaf and in chess, respectively, a link exemplified by people such as the Russian international chess master Sergej Salov (born in 1940). Sergej Salov is not only an excellent chess player, he is also deaf and, thus, obliged to do all the complex thinking of a chess player completely without language. He has won numerous deaf chess tournaments. Here, these two domains of visual thinking without language obviously intersect. From the point of view of *rationalist Neo-Kantianism*, these are interesting domains where linguistic philosophy has no say whatsoever and complex visual thinking and rational problem solving has obviously to be achieved by other means. As it is, *visual thinking*, the application of the "*simple natures*" that spring from the sources of the "*natural light*," would seem to offer the only possible explanation here.

## Visual thinking in geometry

To begin with, I'd like to apologize that in this chapter, my dealing with the subject will be somewhat non-linear and multi-level rather than straightforward and clear. There are several reasons for this. For one thing, *geometry* has always been a classical "battlefield" in the philosophical debate between *rationalism* and *empiricism* and, subsequently, with the emergence of non-Euclidean geometry, between Neo-Kantianism and positivism. Also, as a consequence of Einstein's theory of relativity, it was a prominent issue in early 20th-century philosophy of science, i.e. in the discussion about the "true" structure of space in contrast to "our" perception. We have repeatedly referred to examples from Plato and Descartes that show just how much *geometry* has from the start been a key interest and core element of the doctrine of *rationalism*, as it was for Spinoza. And for Kant, geometrical considerations did not only play a crucial role in the grounding of his theory of perception but was also the key orientation in the development of his theory of space up to the *Critique of Pure Reason*.

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[849] See, for instance, Jean Baudrillard, Die fatalen Strategien, München 1985; Jean-Francois Lyotard, Immaterialität und Postmoderne, Berlin 1985; Dietmar Kamper (ed.), Macht und Ohnmacht der Phantasie, Darmstadt/Neuwied 1986; Luc Ferry/Alain Renaut, Antihumanistisches Denken, München 1987; Herta Nagl-Docekal/Helmuth Vetter, Tod des Subjekts?, Wien/München 1987.

For, roughly speaking, Kant's conviction, expressed as early as in his Inaugural Dissertation of 1770, that there must be an a priori form to the space of our perception and that in the concrete experience, our cognitions *always remain linked to intuition* was the result of his reflections on the "*incongruent counterparts*" in space that in the Euclidean (that is, our biological-human) space of perception cannot be directly mirrored as spatial entities (Kant used the right and left hands as an example).[850] This, then, was the idea that increasingly determined the development of Kant's entire system: that geometrical concepts in our three-dimensional space had to be constructed in the *imagination*, that mathematical operations were dependent on intuition (at least initially, if only by using our fingers), that the internal sense must be a priori constituted in time and that it is in this time that we draw a line in our imagination; and, finally, that it is only in the *imagination* that geometrical figures can be conceived in their pure construction, and that cognition of these figures can always only be apodictic, synthetic-a priori, that is, "intuitive," but never empirical (CPR, B64). The fundamental role that *intuition* plays in Kant sets his philosophy apart from that of Leibniz and the majority of empiricist thinkers and ensures its "grip on reality," as it were, but at the same time highlights its affinity to Descartes. From the point of view of *visual thinking* and the assumption that there is confluence between the visual function and the function of thinking, the key role that Kant assigns to *intuition* indicates that he had understood the importance of vision in the cognitive process far beyond the mere reception of sensory impressions and, as a consequence, could not conceive of cognition as divorced from intuition. Here, the *visual turn* is completely in agreement with Kant but at the same time extends this initial sphere of visual cognition to include thinking, as well, because *intuition* as positioned by Kant is simply insufficient.

The issue has become even more complex by the relatively recent insight, in line with gestalt theory, that the forms of *Euclidean geometry* are the preferred forms of human perception, while further considerations, based on *Lie Transformational Groups*, suggest that these forms are *innate* and, thus, largely determine our form of perception and "*figurative synthesis*" already at the preconceptual level. In addition, there is the controversy about the algebraization of geometry, the dispute about the grounding of the axioms, the criticism advanced by logicism à la Russell, the debate about the form of space and spacetime, to name only these few. The various debates, views, and problems alluded to here would alone fill dozens of volumes. So, since geometry is just one of the fields that are of interest for *visual thinking*, and since this chapter is only meant to offer some

[850] Immanuel Kant, Inaugural Dissertation of 1770, in Immanuel Kant, Theoretical Philosophy 1755–1770, Cambridge University Press 1992, p. 396.

considerations as a starting point, all these issues can only be touched upon.

The valuation of *Euclidean geometry* marks a crucial point in our preliminary considerations. This is so because this form of geometry that is obviously *innate* to us is not only a visible manifestation of the *existence* and *logical potential of visual thinking*, it has also played a major, and grounding, role in the thinking of a great number of – primarily *rationalist* – philosophers. We have already mentioned that in Plato's thinking, geometry has a prominent place and that Plato's "unwritten doctrine" arguably consisted of his observation of the cognitive operations performed by the students at his academy who were set to solve geometrical problems. Descartes, in turn, is well-known as the founder of *analytic geometry*, i.e. the "Cartesian coordinate system" with its x- and y-axes, while his philosophical thinking in the *Regulae* virtually starts out from the thought processes in geometry and leads up to their application to philosophy. Spinoza's one and only work to be published during his lifetime, "*The Principles of René Descartes' Philosophy, Demonstrated in Geometrical Order*," as well as his famous "*Ethics*," conceived and written "*more geometrico*," virtually render homage to the geometrical method; and in Kant, Euclidean geometry plays a pivotal role in his reflections on the three-dimensional a priori space of our intuition, a highly controversial issue since the emergence of non-Euclidean geometry. It is one of the cornerstones of Kant's doctrine that Euclidean geometry and, primarily, geometrical *constructions* in the imagination are synthetic a priori, that is, cannot be derived from sense experience, as well as necessarily and universally valid, and that, secondly, and much more relevant for our subject, conceptual thinking alone does not suffice for us to be able to perform logical operations and constructions, which always also requires *intuition*:

"*Since the propositions of geometry are cognized synthetically a priori and with apodictic certainty, I ask: Whence do you take such propositions, and on what does our understanding rely in attaining to such absolutely necessary and universally valid truths? There is no other way than through concepts or through intuitions, both of which, however, are given, as such, either a priori or a posteriori.*" As an illustration, Kant refers to an example from geometry: "*Take the propositions that with two straight lines no space at all can be enclosed, thus no figure is possible, and try to derive it from the concept of straight lines and the number two; … All of your effort is in vain, and you see yourself forced to take refuge in intuition, as indeed geometry always does.*"[851]

This means three things: firstly, according to Kant, geometrical thinking is essentially synthetic a priori, necessary, universal, and apodictic, that is,

[851] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, B65/66.

belongs to the domain of pure reason, and the correct solutions of geometrical problems are found by logical reasoning, not "sense experience." Secondly, this argument implies that while geometrical constructions indeed stem from *pure reason*, they still need to be linked to "*intuition*" and cannot be achieved in purely linguistic-conceptual terms, or at least not without a visual component. Indeed, given the current algebraization and mathematization of geometry, it should perhaps be called to mind that without intuition, even a mathematician with leanings towards positivism would not know what a specific mathematically expressed geometric figure looked like if he had never before seen one. Also, there is the fact that to facilitate our understanding of numerically presented trends or developments, PowerPoint charts are currently the omnipresent tool for rendering columns of figures more "descriptive" and "intuitively accessible," *at a glance*! On the other hand, this is also a starting point for criticism from the point of view of the *visual turn*, for pure intuition *alone* (that is, the mere registering of the uninterpreted individual image or representation) is by far too "sparse" and not solid enough to actually allow us to perform geometrical operations such as converting a triangle, mirroring, etc. No mere image of a triangle on the retina, and not even a focused multi-hour observation of a triangle, can ever reveal its "simple natures" and invisible relations, as we have abundantly shown. Thirdly, *intuitive* thinking can only mean that a priori spatial imagining has always already been an uncircumventable condition of possibility for any geometrical thinking; which is in line, if in need of some enhancing, with Kant's intention in his Transcendental Aesthetic.

In contrast, we have seen that the thinkers of classical empiricism, and in particular Berkeley, but also Hume, instinctively rejected the synthetic a priori nature of mathematics, and more particularly geometry. Hume, being a highly intelligent sceptic, had a hunch that a discipline for the sciences that could be *visually* demonstrated, that is, be *experienced by the senses* and was, *at the same time*, synthetic a priori, universally valid, and necessary would be a permanent thorn in the flesh of his doctrine of impressionist images, associations, sensations, woolly thinking, habits, and predispositions, for it would be a form of eidetic cognition that is *both* universal and necessary. Even in his *Treatise*, he still thought of geometry as "*doubtful*" and "*fallible*": "[*a*]*s the ultimate standard of these figures is deriv'd from nothing but the senses and imagination, 'tis absurd to talk of any perfection beyond what these faculties can judge of; …*"[852] – an absurd position that was the logical consequence of his utterly flawed approach of prioritizing impressionist sense experience over innate reason. For even with the best of compasses and the finest of pencils, distor-

[852] David Hume, A Treatise of Human Nature, Oxford University Press 2007, p. 38.

tions in the representation of geometrical constructions will, of course, occur, and an approach based on sense experience alone could well mean that when drawing, for instance, a tangent line to a circle, we might never be able to determine with absolute certainty the one point where the tangent touches the circle. But actually, this isn't even the decisive argument for a rationalist understanding of geometry, for as Descartes and Kant have shown, it is in the imagination alone that geometrical considerations are constructed and logically thought through, and their verification is the work not of intuition but of cognitive evidence and deductive thinking *based on* visual representations. It is in our imagination that we draw a diameter that passes through the center of a circle and intuitively grasp the *simple nature*, namely, that this line will bisect the area of the circle, even though the drawing in our compass and straight-edge construction may not be perfect and the penciled diameter may somehow miss the center, and even if it was "only" in our imagination that this line was drawn at all. In his later *Essay*, Hume, having rethought his position, included geometry and mathematics among the infallible sciences. But of course, and in line with his doctrine, he still sought to downscale the practical role of geometry in the research process:

"*Geometry assists us in the application of this law, by giving us the just dimensions of all the parts and figures, which can enter into any species of machine; but still the discovery of the law itself is owing merely to experience, and all the abstract reasonings in the world could never lead us one step towards the knowledge of it.*"[853]

With respect to Locke, we have abundantly discussed the misconceptions that universal laws are abstracted from sense experiences and that what enables us to build skyscrapers is not the "*experience*" gained by the trial-and-error practice of placing bricks on top of each other rather than exact geometrical and static planning. And although Hume puts forth many a skeptical argument against the certain advance of the geometrical science and places special emphasis on the ever-present possibility of error and the vagueness of our ideas – "*how can we deny, that the angle of contact between a circle and its tangent, … as you may increase the diameter of the circle* in infinitum, t*his angle of contact becomes still less, even* in infinitum, …," – he nevertheless has to admit that "[*t*]*he demonstration of these principles seems as unexceptionable as this which proves the three angles of a triangle to be equal to two right ones*, ..."[854] For the argument is both descriptive *and* intuitive-logical. The empiricist tradition of considering

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853 David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, p. 28 (IV./1).

854 David Hume, An Enquiry Concerning Human Understanding and Concerning the Principles of Morals, 3rd edition, Oxford University Press 1975, p, 117 (XII./2).

geometry a suspect element was, then, continued by Bertrand Russell when at the time of World War I, he began to turn his back on German idealism. In the introductory part of his "*Essay on the Foundations of Geometry*," this attitude is quite obvious:

"*Geometry, throughout the seventeenth and eighteenth centuries, remained, in the war against empiricism, an impregnable fortress of the idealists. Those who held as was generally held on the Continent – that certain knowledge, independent of experience, was possible about the real world, had only to point to Geometry: none but a madman, they said, would throw doubt on its validity, and none but a fool would deny its objective reference. The English Empiricists, in this matter, had, therefore, a somewhat difficult task; either they had to ignore the Problem, or if, like Hume and Mill, they ventured on the assault, they were driven into the apparently paradoxical assertion, that Geometry, at bottom, had no certainty of a different kind from that of Mechanics – only the perpetual presence of spatial impressions, they said, made our experience of the truth of the axioms so wide as to seem absolute certainty.*"[855]

Aside from the fact that the "war" referred to by Russell was initiated by Locke and Co. rather than Descartes, the very choice of words – along with an early reference to the "*Continent*" – already indicates that World War I still loomed large. At the same time, Russell's statement is evidence of the key position of geometry in philosophy, namely as a logical-imagining thinking that can at the same time be made visually-operatively manifest (notwithstanding its current algebraization, which does not derogate from the fact as such) while "*sense experience*" alone, in empiricist terms, is obviously not capable of leading to the solution of geometrical problems. For we may employ our senses to observe a geometrical figure on a sheet of paper for hours on end without grasping any universal principle whatsoever about it. Basically, this insight already belongs to Plato who described it very clearly in Book VI of his Republic where he refers to the geometers' approach:

"*And do you not know also that they make use of the visible forms and reason about them, they are thinking not of these, but of the ideals which they resemble; not of the figures which they draw, but of the absolute square and the absolute diameter, and so on – the forms which they draw or make … are converted by them into images, but they are really seeking to behold the things themselves, which can only be seen with the eye of the mind?*"[856]

But at the same time, this description is also indicative of how irritating Euclidean geometry, due to its logical and demonstrative nature in conjunction with its a priori character, must over the centuries have been for

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[855] Bertrand Russell, Essay on the Foundations of Geometry, Spokesman Nottingham 2008 (1919), p. 11.

[856] Plato, The Republic. Translated by Benjamin Jowett, CreateSpace Independent Publishing Platform 2013, p. 143 (Book VI, 510d).

the empiricist doctrine of sense experience. Thus, the triumphant outcry in the late 19th century when it seemed that a first partial victory was within reach and Kant, rationalism, and Euclidean geometry could at last be thrown "into the dustbin of history" – one of those by now familiar figures of speech the positivists cherished – becomes all the more understandable. In his essay, Russell offers a very interesting survey of 19th-century geometry's development towards projective geometry and, finally, non-Euclidean geometry. For Russell, the fact that non-Euclidean geometry was taking root presented a welcome lever that might even allow them to win the "*war*" against "*those from the Continent*," the target being, for a change, not Kant but Hegel. Since this is symptomatic of how beside the point many, if not necessarily all, of these attacks on Kant's theory of perception are, I propose to risk a slight digression from our subject and go somewhat deeper into Russell's criticism here.

In the final chapter ("Philosophical Consequences") of his book, Russell explicitly refers to Kant's "Transcendental Aesthetic" which appears to provide him with the decisive opportunity to overturn Kant's doctrine. He first criticizes what he understands to be a *psychological element* for not being purely logical and, then, and even more fervently, turns against the alleged – and completely misunderstood – *subjectivity of intuition* that he imputes to Kant. It's hard to decide at this point whether this misunderstanding is a purely linguistic one or whether it is one of those almost naïve misunderstandings and misinterpretations of other thinkers one occasionally finds in Russell:

"*But Kant contended, not only that this element is given, but also that it is subjective. Space, for him, is, on the one hand, not conceptual, but on the other hand, not sensational. It forms, for him, no part of the data of sense, but is added by a subjective intuition, which he regards as not only logically, but psychologically, prior to objects in space.*"[857]

Russel's misreading of Kant's theory of perception manifests itself in more than one way. For the idea of space as set forth by Kant in the *Critique of Pure Reason* is not "added" to the sense experiences, let alone conceived of as a *subjective* component such as, for instance, the ability to see that is different in every human being, e.g. nearsightedness, farsightedness, astigmatism, etc. Also, Kant conceives of our form of intuition that always already preexists to any sense experience as *a priori* in the sense that it is, *principally* and *universally*, the only form of perception we have and is, therefore, nothing to do with psychology:

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[857] Bertrand Russell, Essay on the Foundations of Geometry, Spokesman Nottingham 2008 (1919), p. 178.

"*By means of outer sense (a property of our mind) we represent to ourselves objects as outside us, and all as in space. In space their form, magnitude, and relation to one another is determined, or determinable*."[858]

Aside from the fact that Kant – in the German text – speaks of "gestalt" (translated as "form") in this context (which refers back to our discussion in the chapter on *vision science*), the idea behind his reflections is clearly expressed and transparent. Our "*outer sense*," being a "*property of the mind*" (as I see it, Kant's formulation indeed allows for a *biological* interpretation of this "*property*," for both our *senses* and their positioning as a *property*, that is, a *predisposition* of our mind, point in that direction even though one might prefer to conceive of "*Gemüt*" in the German text as "consciousness" rather than "mind"), as well as the expression "*we represent to ourselves*" suggest a *universal* function, inherent to *all* humans, that determines "*objects as outside us*" (note that reality is not denied!) "*and all as in … relation to each other*." In short: in terms of function, all humans have the same form of intuition, namely to "*represent to ourselves objects as outside us, and all as in space*" where they are already organized in terms of "*their form, magnitude, and relation to one another*"!

*Why* we have only this form of perception and no other is a question that Kant, as noted earlier, does not discuss, let alone answer, in this classical passage (CPR, B 145/146). This, then, is how Kant organizes intuition, representation, and concept in this context:

"*But all experience consists in the intuition of an object, i.e., an immediate and individual representation, through which the object is given as to knowledge, and a concept, i.e., a mediate representation through a characteristic common to many objects, whereby it is therefore thought*."[859]

This is a very important statement with respect to any definition of the basic elements of perception as conceived of by Kant. "*Intuition*" is the "*immediate and individual representation, through which the object is given as to knowledge*." Thus, basically – and this will later be conducive to my criticism –, *intuition* is the immediate and individual "image" that is "given" to us in the representation, no more than that. In our chapter on *vision science*, we have discussed the way images are actually formed, so this doesn't need repeating here, since even at this preconceptual level, there is of course nothing "given" about this image, there is only interpretive construction; but this will be dealt with in detail in the chapter on Kant. And then there is the second element of Kant's epistemology, the *concept*,

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858 Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 157, B 37).

859 Immanuel Kant, What Real Progress Has Metaphysics Made in Germany since the Time of Leibniz and Wolff?, in Immanuel Kant, Theoretical Philosophy after 1781, Cambridge University Press 2002, p. 358f.

which transforms the individual and immediate intuition into something universal and imposes its rule on what is intuited but is of no relevance for the present discussion. Kant, then, clearly and distinctly explains how he conceives of the way cognizing an object in space happens:

"*The form of the object, as it can alone be represented in an intuition a priori, is therefore based, not upon the constitution of this object in itself, but on the* natural constitution of the subject (my emphasis) *who is capable of an intuitive representation of the object; and this subjective in the* formal constitution of sense (my emphasis), *as receptivity for the intuition of an object, is the only thing which makes possible a priori, i.e., in advance of all perception, an a priori intuition; and now both this, and the possibility of synthetic a priori judgments from the standpoint of intuition, can be quite well understood.*" (loc. cit., A 27, p. 359)

The essential point for me to single out this passage from Kant is the expression "*natural constitution of the subject*," already highlighted in the above, for it clearly indicates that everyone has to perceive for him- or herself, subjectively, just as everyone can only eat for him- or herself. But although representing an object can only be done by subjects and subjectively, the "*formal constitution of sense*," with a strong emphasis on "formal," is an *objective component* of this perception, for *the way* the "image build-up" from sensory impressions happens in humans is formally predefined and the same in all of us, namely as the three-dimensional (Euclidean) representation of space in time.[860] Kant needs to express himself so peculiarly because he wants to avoid being accused of grounding our mode of perception in "psychological" terms and, moreover, abstains from giving a concrete – for instance *biological* – explanation. As a consequence of its unbroken commitment to this attitude, Kantianism, and in particular *Neo-Kantianism*, has occasionally been accused of being an "*academic philosophy, revolving in abstract thought, estranged from the real historical self-perception of man, …*"[861] To this, a *rationalistically* reformed *Neo-Kantianism* would reply: modern science teaches us that the "*natural constitution of the subject*" can naturally be inferred from evolutionary biology, for, otherwise, it would make no sense to speak of a "*natural constitution*," in the first place. Of course, the three semicircular ducts of

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860 In this context, there is an interesting discussion about Thomas Reid's – allegedly non-Euclidean – theory of vision, initiated by Norman Daniels (1972), Thomas Reid's Discovery of a Non-Euclidean Geometry, Philosophy of Science 39 (2):219–234; cf. the very instructive and lucidly argued correction by Gideon Yaffe, Reconsidering Thomas Reid's Geometry of Visibles, in: The Philosophy of Thomas Reid, Blackwell Publishing, Malden/Oxford 2003, p. 189ff.

861 Rudolf Malter, Heinrich Rickert und Emil Lask, Zeitschrift für philosophische Forschung 23 (1969), p. 86f. (the accusation is not made by the author but referred to as an example of the more general objections currently raised against Neo-Kantianism).

the vestibular organ in the internal ear are adapted to a three-dimensional world, and of course our perceptual space is three-dimensional, and of course our limbs are the "instruments" for us to learn about the three-dimensionality of space and about objects in a three-dimensional tactile room as described by Poincaré,[862] and of course our innate gestalt laws involve Euclidean forms. Wolfgang Metzger comments on this from a gestalt theory point of view:

"*When Kant describes three-dimensional space as a form of the intuition and, thereby, as a condition of possibility, inherent to us, of all experience he means exactly the same thing. And this view, which is supported by E. Hering and, more recently, H. Werner, is confirmed by each and every spatial experience insofar as we are not capable of having two-dimensional intuitions at all, every two-dimensional image that we face comes with a space before it which our gaze crosses to meet it, and a space behind it which is hidden from our gaze by it. All this may be as vague and as fluctuating as it happens to be, it is nevertheless an integral part of the complete description of what we see. It is in this sense, then, that the depth of the visual space is as primary a property as its height and its width are. As long as it was believed that the physiological processes that are directly involved in seeing happened in the retinas, one could conceive of this depth as a 'contribution' of the soul. … The visual center in the cerebral cortex where the processes in question actually occur are not two-dimensional membranes. Why, then, should these processes not extend to all three dimensions? So, in this sense, if you like, the general possibility that what one sees has three dimensions can even be deduced from the manifold activation potentials of the cerebrum…*"[863]

Thus, Kant, true to his Copernican revolution, makes three-dimensionality the basis of the *human* space of perception, which is completely consistent with today's biological sciences, and at the same time defines the *universal* and, therefore, *objective* – as well as only possible (at least in human beings) – *form*, or configuration, in which to organize our sensory impressions of external objects. As for Russell's misreading, this passage clearly shows that Kant's Transcendental Aesthetic is not about some form of a *subjective-psychological* grounding of perception, which would be different and accidental in each subject, it is about a *natural constitution of the subject* which, being equally inherent in all humans, is a condition of any perception and, therefore, universally valid and *objective*, and always already preexists a priori to any perception. Just as the computer's operating system is always already pre-installed, that is, always already preexists to all applications and programs and always already co-determines the form of the incoming data stream – failing which, we would never be able to boot a computer at all. It is in this sense alone – that all humans are equipped with this "operating system" (to use the modern term) which is

862 Henri Poincaré, Science and Method, Cosimo, Inc. 2010 (1914), p. 100–104.

863 Wolfgang Metzger, Gesetze des Sehens, Frankfurt/M. 1953, p. 260 (passage not included in the – much abbreviated – English edition; translator's note).

"subjectively" theirs but at the same time, being the same for all of them, objective and has, therefore, to be conceived of as *universal* in the *natural constitution of the subject* – that Kant uses the terms of *natural constitution* and *subject* in this context even though he himself would stick to a strictly transcendental argumentation, but this does not derogate from the argument of the fundamental uniformity in all humans. This is the very point that Russell simply misunderstood in Kant, or perhaps preferred to misunderstand so he could construe a weakness and use it as a target for attack.

Russell's second misdirected criticism concerns the importance Kant accorded to the concept of *construction*. For Kant, construction is relevant not in terms of its importance in Euclid's doctrine but because he believed that even though our reason (at least according to his doctrine) builds on conceptual thinking, mathematics and geometry must ultimately be traceable to the "real objects of the intuition." Kant defines this relation between *intuition* and *conceptual thinking* in the *Critique of Pure Reason* in the well-known chapter "The discipline of pure reason in dogmatic use," where he describes how it is supposed to work in practice:

"*Philosophical cognition is rational cognition from concepts, mathematical cognition that from the construction of concepts. But to construct a concept means to exhibit a priori the intuition corresponding to it. For the construction of a concept, therefore, a non-empirical intuition is required, which consequently, as intuition, is an individual object, but that must nevertheless, as that construction of a concept (of a general representation), express in the representation universal validity for all possible intuitions that belong under the same concept.*"[864]

What Kant means is this: if, for example, I have the *universal concept* of a square – to get away from the example of the triangle – which, as a concept, implies the *definition* its construction needs to follow, I can construct a square in my pure intuition, my imagination (on my "mental drawing board") or draw it on a piece of paper. But – and this is crucial – this *individual* object (intuition is individual) on the drawing board, be it mental or real, will answer to the *universal concept* of the square only if it is constructed step by step and with logical correctness. So, what we want is a figure with four equal angles and four equal sides. This, of course, is easy, but when it comes to more complicated figures, one may take a pencil and do a drawing. This is because this drawing, even though it is *individual*, is *at the same time universal* because even in the intuition, it always follows the *rule* of construction; moreover, it cannot be derived, by experience, from an empirical square because in the real world, there is no such thing as a perfect square, as we have already explained at some length. The

[864] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 630 (B 741).

*construction* is the *act of a priori synthesis* in which we conceive the defined figure by *simultaneously* imagining and thinking it. At any rate – to counter a well-known objection by Berkeley – the universal nature of the figure is ensured at all times.[865] Kant comments on this fact as follows:

"*Philosophical cognition thus considers the particular only in the universal, but mathematical cognition considers the universal in the particular, indeed even in the individual, yet nonetheless a priori and by means of reason, so that just as this individual is determined under certain general conditions of construction, the object of the concept, to which this individual corresponds only as its schema, must likewise be thought as universally determined*." (loc. cit., p. 631, B 743)

The argument, suggested by Russell, that Kant had been taken in by (antiquated) Euclidean geometry and its constructions because this was the only available geometry is beside the point of what Kant wants to explicate here. Now, one could of course object that the geometrical construction is an unnecessary and antiquated procedure since the problem (a square in the above example) can be algebraized and, then, solved in purely mathematical-algebraic terms. But whoever argues like this misses an important point, for Kant is not concerned with the representation per se but with *construction* (in the imagination). A logical step-by-step construction is not copying or looking, it is a logical extension, or transcension, of existing knowledge. For what do we do, after all, when we synthetically a priori construct a straight line in the form of a linear equation (e.g. $y = mx + d$ or, in space, $ax + by = c$), as taught by Descartes? We do not directly *construct* a straight line in the intuition, but we do construct it such as we know it – and are, thus, led to construct it – by intuition. If we want the straight lines to intersect each other at a right angle, or all straight lines to be equal in length, so we can construct a square, we can of course use algebraic equations to "recreate" a result we have *previously* figuratively imagined. If, however, we did *not already know* it from the imagination, we would not be able to "recreate" it in the form of an algebraic equation either, except in trial and error fashion.

On the part of empiricism, arguments against Kant's synthetic a priori model and the role of intuition in mathematics and geometry were primarily raised by Philip Kitcher.[866] His objections were organized, by Jesse Norman, into three groups of arguments which basically reflect the positions of classical empiricism and J.S. Mills, plus one or two independent ideas that are due to a *naïve ecological realism*. The first objection comes in the form of the argument that there can be no such thing as a

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865 George Berkeley, A Treatise Concerning the Principles of Human Knowledge, Dover Philosophical Classics 2004, p. 17.

866 Cf., for instance, Philip Kitcher, Mathematical Knowledge, Oxford University Press New York / Oxford 1984.

simple generalization of insights gained from an individual geometrical figure. In Kitcher, this is expressed in the form of the "*irrelevance objection*," as Norman calls it. Kitcher denies that insights gained from a constructed drawing can be generalized to other figures or cases. Jesse Norman specifies that Kitcher's error is due to a misreading of Kant's doctrine. In Kitcher's description, it would seem that we create figures, look at them with the eyes of the mind and, in doing so, gain a priori insight (loc. cit., p. 49f.). This argumentation is, of course, diametrically opposed to the real process. For when we use auxiliary lines, extensions, etc. to construct Euclid I. 32., for instance, we are already applying the a priori forms of the mind. We do not add the parallel *auxiliary line* because we have already empirically seen it somewhere but because, as a result of thinking, we use it as a necessary accessory. The objection also completely misreads the relation between the individual drawing – perhaps on a paper napkin – and the logical thought that underlies it and that is expressed by the drawing. If, for instance, our understanding makes us realize (before we mark it on the drawing) that a diagonal will bisect a square into two equal halves or two equal triangles, then the thought that is thus expressed is completely independent of the quality of the drawing as long as the latter is consistent with the essence, or structure, of the intended figure. Of course, if my square is so carelessly drawn that it comes to resemble a trapezoid, then the reflections that were meant for a square do not apply anymore either; similarly, if in algebra, I jot down an X so carelessly that in my haste I take it for a Y, I am of course unable to correctly solve the equation. But all this is actually beside the point, which is that the drawn square is primarily a square that is *thought* according to a universal rule.

Kitcher's second objection, called the "*impossibility objection*" by Norman, namely that it is fundamentally impossible to represent certain things, e.g. an infinite number of points on a straight line, is already well-trodden. It is interesting insofar as it calls to mind a comment by Hegel on an assertion made by the empiricist Pierre Bayle. In a discussion about Zeno's "arrow paradox," the latter had claimed that "*if*" one could draw an infinite number of vertical lines into a straight line, the rationalist argument that it is a continuum could be invalidated in favor of an atomistic conception. Hegel's only comment was a laconic: "*yes, if…!*", for Bayle would have obviously spent the rest of his life attempting to draw an infinite number of vertical lines into a line. At any rate, infinity is admittedly hard to represent in a drawing, but arguably also hard to imagine, and harder still to experience by sensory impressions. The third objection – Norman calls it the "*exactness objection*" – is the weakest one but is nevertheless occasionally raised by empiricism. In essence, it says that one wants to draw a straight line, for example, but that this line will be imper-

ceptibly bent and the construction will, therefore, be incorrect. One occasionally comes upon fun geometrical constructions that are deliberately distorted so they seem to prove something that is entirely wrong. Only a very close look will reveal the slight distortion, and EAN proponents like to take this as evidence of how fallacious Kant's approach is, in the first place. Actually, what they should worry about, rather than bent straight lines, is bent thinking – see the preceding chapters. To reiterate: the logical construction of a figure is the expression of a priori logical thinking, and the understanding is not the slave of sense experience, so when we draw a diagonal line to bisect a square into two halves, this operation is correct even if the diagonal is not meticulously straight. The argument results from a fundamentally wrong understanding of Kant's doctrine, the a priori thought per se, and from the misguided attempt to ground a purely empirical philosophy of mathematics. This is already evident in Kitcher's epistemological orientation, namely a naïve "*ecological realism*" that he defines as follows:

"*Ecological realism offers a theory of perception according to which perception is* direct" (emphasis on "direct" by Kitcher; my note).[867]

Since we have already exhaustively discussed the great illusion of any "*direct*" perception in the chapters on *vision science* and classical empiricism, and since this naïve approach in all its poorness is today not even defended by those in vision science who have leanings towards empiricism, Kitcher's theory can be quickly shelved here.

However, the above quotation from Kant poses a different problem, for to be able to construct the universal in the particular, or the *concept* in the *intuition*, and vice versa, Kant needs to introduce the *schema, or schematism*. This is the very point we will discuss in the chapter on Kant, for the construction, or, rather, the logically constructing imagination, is neither a *concept* in itself (as Kant himself repeatedly states, having made this the very starting point of his reflections) nor an *intuition* per se (that he sometimes charges with more than an individual particular image can carry), it is *visual thinking* – a fact that is increasingly brought home to us the farther we move away from familiar figures such as triangles and squares! Now, Kant introduces a well-known comparison to illustrate how such a construction is achieved by a philosopher or a geometer and which I am happy to use as a support for my thesis:

"*Give a philosopher the concept of a triangle, and let him try to find out in his way how the sum of its angles might be related to a right angle. He has nothing but the concept of a figure enclosed by three straight lines, and in it the concept of equally*

[867] Philip Kitcher, Mathematical Knowledge, Oxford University Press New York / Oxford 1984, p. 11.

*many angles. Now he may reflect on this concept as long as he wants, yet he will never produce anything new. He can analyze and make distinct the concept of a straight line, or of an angle, or of the number three, but he will not come upon any other properties that do not already lie in these concepts. But now let the geometer take up this question. He begins at once to construct a triangle. Since he knows that two right angles together are exactly equal to all of the adjacent angles that can be drawn at one point on a straight line, he extends one side of his triangle, and obtains two adjacent angles that together are equal to two right ones. Now he divides the external one of these angles by drawing a line parallel to the opposite side of the triangle, and sees that here there arises an external adjacent angle which is equal to an internal one, etc. In such a way, through a chain of inferences that is always guided by intuition, he arrives at a fully illuminating and at the same time general solution of the question.*" (loc. cit., p. 631f., B 745)

This passage is helpful insofar as in his urgent desire to demonstrate the superiority of the *constructing* geometer – "*Now he divides the external one of these angles by drawing a line parallel to the opposite side of the triangle, and sees that here there arises an external adjacent angle which is equal to an internal one, etc.,*" – Kant puts more into this construction process than what can rightly be attributed to *intuition* per se, for the geometer doesn't *see* these things, he *thinks* them! Which means that this is once more a point where *visual thinking* is required.

Classical Euclidean geometry as the supreme science of rationalist "continental philosophers" was thus conceived of as a science that advances with necessity and universality, is *constructed* purely in the imagination (that is, not empirically), and is thought and proved by both visual and conceptual thinking. Thus, the *visual* elements – Kant here speaks of *intuition* and *imagination* – and *conceptual thinking* come together and interact with each other. However, these are not the only interesting reflections and connections that are being increasingly clarified in *vision science* as well as by the philosophical reflections on Euclidean geometry in the fields of nature and cognition. First of all, there is the surprising but ascertainable correspondence, as previously discussed, between the *gestalt laws* of perception and *Euclidean forms*. In the chapter on *vision science*, we have seen that the innate *gestalt laws* are the reason why there is a preference for us to project, in the act of seeing, simple and closed forms unto the often completely irregular arrangements of dots, stones, or other items. This means that our *active cognitive processing of sensory impressions*, law-based and rule-guided as it is, makes us "see," by preference, certain *simple* or "*good*" forms and gestalts; which clearly marks the difference between the visual image and the retinal image. Thus, what plays a role here is not only the "*poverty-of-the-stimulus*" argument, there clearly is also an interpretation of the underdetermined sensory impressions that is oriented, in a systemically predetermined way, to *Euclidean forms*. By this interpretive process of organizing and ordering our sensory impres-

sions which ensures that "their order is imposed on the things" already at the gestalt level, the world is made readable and understandable for us. And in this perceptual process, the square, the circle, the straight line, the right angle, etc. are in a distinctly privileged position.

## Euclidean geometry, gestalt theory, vision science, figurative synthesis, Lie Transformation Groups, a priori

As a logical consequence, the problem areas discussed so far give rise to a number of challenging further questions, but also to pioneering approaches that are gradually beginning to converge and amalgamate. It was Ernst Cassirer who, in one of his last studies, first explored the convoluted issue in an innovative and indicatory way. When he wrote this article, Cassirer was already in exile in the USA, so his ideas no longer fell on the fertile intellectual ground they deserved since, at the time, he was arguably the last living giant of *Neo-Kantianism* who had the philosophical and scientific potential to stand up to the positivist mainstream and achieve a groundbreaking synthesis between *Neo-Kantianism* and the sciences. In his interesting article "*The Concept of Group and the Theory of Perception*,"[868] which I will later discuss in detail, he already highlights the importance, for the theory of perception, of *Lie Transformation Groups* (named for Sophus Lie) or *Transformation Groups* (named for Felix Klein) and also refers to the works of Poincaré who had integrated Lie Transformation Groups into neo-Kantian theory, as well as to a certain rehabilitation, by means of Lie Groups, of Euclidean-geometrical forms.[869]

Cassirer had probably come to know the concept of transformation groups during his study of modern geometry of the Felix Klein school. "*By means of the concept of transformation group, Klein succeeded in creating law-based relations between the individual geometries and integrate them into a unified system*," as Karl-Norbert Ihmig stated.[870] As I see it, the main question concerning Kant's epistemology arises from his polar positioning of *intuition* and *concept*, the transitions from the *manifoldness* of sensory impressions to *figurative synthesis* and *gestalt*, to *schema*, to the *categorial unity of synthesis* and, finally, to a *conceptual definition*, as well as from how they are supposed to systemically come together and interact. How does the "*figurative synthesis*" thus described, which is already achieved at the intuitive level by the *laws of gestalt theory*, relate to the

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868 Ernst Cassirer, The Concept of Group and the Theory of Perception, Philosophy and Phenomenological Research, Vol. 5, No. 1, Sept. 1944 (translated by Aron Gurwitch).

869 See Isaak M. Yaglom, Felix Klein and Sophus Lie, Boston: Birkhäuser 1988.

870 Karl-Norbert Ihmig, Grundzüge einer Philosophie der Wissenschaften bei Ernst Cassirer, Darmstadt 2001, p. 3.

*figurative synthesis* achieved by *productive imagination* as conceived of by Kant? As it is, figures and gestalts are already visually formed BEFORE the categories can do their conceptual-synthetic work. The categories do not get to work on a chaos of sensory impressions but on a visual field that is already figuratively structured or conversely, they are even more archaic than Kant assumed. In the chapter on Kant, this problem, i.e., that the Kantian synthesis has visual and conceptual elements, will be explored in more detail, as well as the consequences that this double meaning may have. Another justified objection on the part of EAN could be that this preference for certain gestalts and forms might also be due to cultural imprint and childhood drill ("Abrichtung," Wittgenstein) or "training on the part of society" (Quine), and that there is no explanation as to how these perfect geometrical figures – concerning which Frege, Russell, and Popper conjured up a "*third world*," a "realm of ideas" that exists independently of man – are supposed to *a priori* "exist" in our mind since there can be no such perfect figures in the real world, as we have already argued at some length.

More recently, however, there are more and more indications as well as findings of empirical scientific studies which strongly suggest that these Euclidean-geometrical forms are obviously *innate*, which means that this is another issue where we are about to come full circle. In the chapter "*Geometric Concepts of the Visual Cortex as the Basis of Visual Information*" of his book "*The Judgement of the Eye*," the philosopher Jürgen Weber also thematizes the strong correspondence between *Euclidean geometry* and the laws of *gestalt theory* which today, as we have seen, has become the basis for *vision science* as well as a key reference, in the *artificial intelligence community,* for creating vision-oriented computer programs. Weber further draws on the mathematical theory of *Lie Transformation Groups*, developed late in the 19th century by the Norwegian mathematician Sophus Lie. Lie started to apply algebraic group transformations to geometrical forms and thus obtained simple elementary figures, the so-called "orbits." Weber not only explored geometrical forms and patterns in the field of art-historical artifacts and the development of the drawings produced by children of different age groups, he also conducted a vast number of *empirical studies* at his institute at the Technische Universität, which finally led to the following insight:

"*Both the gestalt psychologists, who approach their subject from a phenomenological basis, and the Lie Groups with their mathematical approach, build on the hypothesis that forms of Euclidean geometry are of great importance for seeing and memory – for the ability to identify an object visually as well as for the visual "declaration memory" and short-term memory. (…) Neurophysiology has meanwhile produced an amazingly exact atlas of the brain and the workings of the neurons, but basically it can only contribute very little to these discussions. Gestalt psychology and the Lie Transfor-*

*mation Group (Hoffman and Dodwell, among others) believe that in the seeing process a certain agreement can be detected between the phenomena in our environment and the so-called Euclidean geometric forms or the corresponding "orbits" of the Lie Group. The weak point of these theories is that an infinitely large diversity of phenomena have to coincide with a comparatively small group of Euclidean forms to allow conclusions to be drawn.*"[871]

Building on the insights of gestalt psychology and mathematical Lie Transformation Groups, Weber developed an interesting theory according to which our cognitive perceptual processes are not directly guided by the few elementary forms of Euclidean geometry per se. Rather, our mind configures, forms, and recognizes the gestalts of the environment by computing the "differential" between these environmental forms and the perfect *innate* Euclidean forms:

"*My theory states that we do not perceive, judge and remember something by producing a correspondence between the Euclidean forms or "orbits" and the phenomena in our environment, but rather that we come to conclusions just because of the differences to these Euclidean forms. … We perceive through comparison, through comparison with the geometric forms invented by our visual cortex and the schemata made up of them. Our brains have developed these geometric forms from the basic processes of contraction and expansion, horizontal and vertical distortion and rotation. In my opinion, the invention of the geometric forms from the basic processes is inherited with our genes*." (loc. cit.)

The logical prerequisite, however, for us to be able at all to meaningfully organize and structure the sensory impressions that come in from the environment is the existence of *a priori forms*, i.e. the *schematic Euclidean forms*. These forms have obviously developed in the course of evolution – at least, this is the most likely explanation from a modern-day perspective –, they are "*inherited with our genes*," that is, they are *innate*. This is consistent with the insights already discussed in the chapter on *vision science* as well as in the context of *innate knowledge* and *innate capacities*. Due to our evolutionary history, we can dispose of innate a priori knowledge that allows us to organize and order the fluctuating chaos of incoming *sensory impressions*. This knowledge comprises forms that are largely in accord with *Euclidean geometry*, and it is these perfect gestalts, forms, or ideas that provide the basic structure, the backdrop, against which we organize and order, in the perceptual process, the irregular and chaotic sense impressions. There is no need at all for an independent "third world" of ideas as conceived of by Frege and Russell, which would indeed be the very form of metaphysics they so strongly reject in other respects. So far, so good. But for us, geometry is so much more, for it not only serves as a model for the *figurative synthesis* that organizes the perceptual process, it

[871] Jürgen Weber, The Judgement of the Eye, Springer Wien New York 2002, p. 9.

is also the domain par excellence of *rationalism*, the one where our *visual thinking* manifests itself in its purest form. Once we understand that the forms of Euclidean geometry are innate to us, the very position of geometry in the cognitive process starts to shift, as do certain positions in the debate about the position of *Euclidean geometry* in its relation to *non-Euclidean geometry*. How can we, in the internal neo-Kantian debate, speak of a purely logical a priori mode when, at the same time, there is very strong *evidence* that the a priori forms are *innate*, that they are part of the "*natural constitution of the subject*"? Why should we settle for Kant's (correct) logical-argumentative insight when today it can be corroborated by biological-scientific findings and, what is more, is even *in accordance* with them?

In the chapter on *vision science*, I have already referred to the fundamental change brought about by neuroinformatics and its novel, gestalt theory-based perspective on vision. Now, we also need to consider its consequences for a re-valuation of Euclidean geometry. In the 1980s, Peter Dodwell, building on W.C. Hoffman's preliminary mathematical work, had already started to exploit *Lie Transformation Groups* for the theory of vision and human cognition. Basically, his theory states that a "*manifold*," a mathematical surface, corresponds to a field – which may also be a visual field – that can be defined by vectors. Transformations, i.e. continuous "smooth" movements, of geometrical forms in this field rely on vector projections whose movements, in turn, generate gestalts, the so-called "orbits." Dodwell proposes to organize these transformations into three levels of perception: Level I is the level of incoming sensory perceptions, the physical-biological level, so to speak; Level II is the level of figurative synthesis, which is also the focus of his studies; and Level III is the conceptual-intellectual level.[872] From my point of view, this division provides a very good general framework for a reordering of the pre-conceptual elements of Kant's epistemology. Dodwell offers a practical example:

"*Think of a ball floating down a river, whose surface is clearly a type of manifold; at any instant in time, the ball's motion (speed and direction) could be expressed as a vector. This is the local, instantaneous characterization of the ball's path; the vector will change over time as the ball moves. One could describe the path of the ball in terms of those successively changing vectors. But there are many paths which the ball could take, depending on the point at which it is dropped into the river, and on the pattern and direction of flow of the river's current.*"[873]

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872 Peter C. Dodwell, Local and Global Factors in Figural Synthesis, in: Peter C. Dodwell & Terry Caelli (eds.), Figural Synthesis, Lawrence Erlbaum Associates, Hillsdale 1984, p. 221.

873 Peter C. Dodwell, The Lie transformation group model of visual perception, Perception & Psychophysics 1983, 34 (1), 1–16.

The mathematical theory of *Lie Transformation Groups* provides us with a solid model, an algorithm, that allows us to describe and functionally link the *visual field* and its logical structure to the neurophysiological architecture of those brain structures that are involved in vision:

"*Invoking the concept of a vectorfield allows one to proceed naturally from a local process, the vector, embodied in individual neuronal activity, to paths or trajectories across parts or even the whole of the relevant manifold, as described in the previous section. That is the neuropsychological aspect of the theory: the perceptual aspect interprets those trajectories in some cases as visual contours or, in others, as the basis of a certain class of continuous transformations which occur naturally in the visual field.*" (loc. cit., p. 5)

Dodwell further sees a clear connection with the simple "good" gestalt of perception that gestalt theorists had intuitively-logically realized in terms of the concept of "good gestalt" but lacked the scientific instruments to formalize, as well as with the evolutionary development of man, the requirements of vision science, and Lie Transformation Groups:

"*This primitive model of LTG/NP (Lie Transformation Groups/Neuropsychology) states that certain cortical vectorfields, of which Hubel and Wiesel-type local contour detectors are elements, are engrained through evolutionary pressures in the visual cortical manifold. The idea, as I shall explain, is that certain transformations and transformation groups are necessary conditions for computing invariant properties of a perceptual environment when the organism moves freely within it. If these transformation groups are frequently, indeed almost continuously, in operation, their presence in "hardwired" form must enhance the organism's ability to cope with the vicissitudes of the ever-changing visual field. If the vectorfields are structured so as to compute these transformation groups, then it should follow that their orbits, or the corresponding patterns which are attuned to the vectorfield structure, should be both salient and easy to discriminate amongst all classes of patterns*."[874]

Dodwell's reasoning is very clear and makes sense: in the course of evolution, our basic projective perceptual structures have developed so as to rely on the simplest possible and most universal gestalts to organize the perceptual process, a rapid and universal interpretive configuration of environmental information lacking which day-to-day survival would arguably not have been possible at all. Scientifically, this perceptive faculty, this "figurative synthesis" in Kantian terms, can be very adequately described in terms of the vectorfields of Lie Transformation Groups. These are very close to the basic forms of Euclidean geometry and can sufficiently account for both the basic elements and the smooth transformations of our visual images:

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[874] Peter C. Dodwell, Local and Global Factors in Figural Synthesis, in: Peter C. Dodwell & Terry Caelli (eds.), Figural Synthesis, Lawrence Erlbaum Associates, Hillsdale 1984, p. 222f.

"*The theory of continuous transformation groups developed by Sophus Lie explains how these local translations can be integrated into smooth transformations across the manifold, or alternatively to generate smooth contours – in our case visual patterns.*" (loc. cit., p. 224.)

Dodwell further describes a number of empirical tests with four-month-old infants, as well as with cats, that showed the superiority of and familiarity with LTG patterns. In the same reader, there also is a paper by W.C. Hoffman which, although rather technical-mathematical in nature, is of interest for our present reflections insofar as he establishes a correlation between the laws of vision – size constancy, shape constancy, object constancy, etc. as discovered and described by Descartes – and LTGs:

"*Our main point is that for static figures projected onto the frontal plane the group of Euclidean motions generated by translations and rotations (the group of Lx, Ly, and L0) can, when augmented by the appropriate prolongations and higher differential invariants, generate … also the full visual contours of actual cats, people, objects, and scenes. The basic parameters are direction at a point and curvature at the point.*"[875]

What is interesting here for our present discussion of *visual thinking* in geometry is the further step of applying LTGs to *Euclidean space*. If we pursue this line of thought, a very clear and plausible conclusion imposes itself: in purely mathematical-physical terms, we need to think of our universe as *non-Euclidean*, as a "curved" space or spacetime. This is a central insight of Einstein's general theory of relativity, which has proved to be valid to the present day, so there is no getting around it. The immediate environment, however, where all living beings including man have physically-biologically evolved on earth is *Euclidean* because in everyday life, the departures from the actual curvature of space are completely negligible and, moreover, "impractical" in technical-evolutionary terms. Euclidean geometry, as Poincaré already emphasized, is the most "*convenient*" form among the various geometries conceived so far. This is why houses, streets, or bridges are planned within a Euclidean framework, and this applies even more to the fixtures and tools of man. But already in the 18th century, geniuses such as Carl Friedrich Gauss or Immanuel Kant clearly saw that due to the earth`s being a "sphere," trajectories covering greater distances would necessarily imply a curvature. Thus, Kant notes in his Reflections:

"*Reise ich auf einer Ebene oder Sphäroid? Die Curvatur muss ich messen.*"[876]

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875 W.C. Hoffman, Figural Synthesis by Vectorfields, in: Peter C. Dodwell & Terry Caelli (eds.), Figural Synthesis, Lawrence Erlbaum Associates, Hillsdale 1984, p. 278.

876 "Do I travel on a plane or a spheroid? I need to measure the curvature" (tentative translation since no English translation could be found; translator's note); Im-

Today, of course, this type of considerations plays a key role for computing flight trajectories. But in the evolutionary development of vision, motion, and cognition as the center of control, there always were only very short trajectories to cope with, where Euclidean space is optimal. Early man sketching the way from the fire pit to the ford will always have drawn the shortest possible, i.e. straight, path. To this end, there was no need for him to account for the curvature of the earth's surface, let alone curved space, so the shortest connection between two points is always a straight line. If we connect two points in our imagination, we always use a *straight line* since this is the *shortest possible way*. This is also why on these short trajectories, Lie Group Transformations, the "orbits," result in gestalts that are simple and consistent with the patterns of Euclidean space. This physical-geometrical fact is even reflected in the muscles that serve eye movement: these muscle groups are organized in a way that ensures the consistency between eye movements and the conditions of three-dimensional space. They are not organized four- or n-dimensionally. The same is true for another muscle group that serves to enable rotations in this three-dimensional space; as well as for the three semicircular ducts of the vestibular organ already mentioned above – biologically, the human body is simply, and conveniently, adapted to three-dimensional Euclidean space. Therefore, in principle, the form of intuition postulated by Kant, in the Transcendental Aesthetic, for three-dimensional space "*from the human standpoint*" is not inappropriate. It perfectly correlates with the fact that the "orbits," the fundamental gestalts of Lie Transformation Groups, are simple and elementary: parallel lines, crosses, circles – simple figures that result from the simple movements that, on earth, are physically possible in the field of vision. In this line of thought, right-left parallel horizontal lines and top-down parallel horizontal lines can result in a square, crosses in subdivisions, both of them in right angles, etc. Thus, the simple and elementary forms of Euclidean space are biologically engraved into and available in the "grammar of vision." In Dodwell's words:

"*It should now be clear that a major postulate of the LTO theory is that the basic structure of the visual manifold is determined by the simple Lie operators that express its vectorfield components, and that these, in turn, are at least to a high degree determined by the ecological and evolutionary constraints under which visual systems have developed.*" (loc. cit., p. 9)

This step means that the "elementary" forms of vision can now be inferred from their origin, which also answers the question of how it is possible for the forms of Euclidean geometry to be "*inherited with our genes*." It does not, however, answer the question of what enables us to

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manuel Kant, Reflexionen Kants zur kritischen Philosophie: Aus Kants handschriftlichen Aufzeichnungen, Benno Erdmann (ed.), Leipzig 1882, Nr. 1771.

perceive more complex forms and gestalts – for this, we need to draw on the laws of gestalt theory described in the chapter on vision. What is crucial just now, however, is to understand how to explain the fact that the basic forms of *Euclidean geometry*, just as the natural numbers 1, 2, and 3, are part of man's universal innate knowledge rather than objects of a "third world."

This understanding will further help us to adequately respond, from a perspective of *rationalist Neo-Kantianism*, to the criticism leveled by EAN against Kant's theory of space as set forth in his *Transcendental Aesthetic*. Rather than go into the extensive debate about this issue let me just refer to Ernst Cassirer's discussion – from a perspective of Neo-Kantianism -of Einstein's theory of relativity, more particularly the chapter "Euclidean and non-Euclidean geometry."[877] What is much more important in the present context is the consideration already applied to the noticeable correspondence between the *grammar of vision* and *universal grammar*: if the simple gestalts of Euclidean geometry or Lie Transformation Groups are genetically anchored in the cognition of vision, it is certainly conceivable, since visual thinking had evolutionarily developed from vision, that these forms are also present in visual thinking and can, therefore, be projected, by thinking, onto the "bad" gestalts of reality. Without wishing to anticipate, this would mean that we have found a crucial and convincing biological explanation of the "*intuitive evidence*" discovered by Descartes in the context of his geometrical reflections in the *Regulae*.

After these introductory considerations, let's now return to our actual subject, namely the central role of Euclidean geometry as *visual thinking made visible*. Geometrical ornaments on decorative objects using circles, checkered patterns, and parallel lines have been ascertained as far back as 40,000 years before our time, which indicates the intuitive presence of geometrical gestalts in virtually all homo sapiens cultures. Methodically implemented geometry including the related discovery of fundamental geometrical propositions can be traced back as far as to land surveying in Ancient Egypt and Babylonia more than 5,000 years ago, but can also be found in architectonical and military applications.[878] The ancient Greeks were the first to transform into a science what up to then used to be nothing but purposeful everyday-life geometrical activities. Names such as Thales, Pythagoras, and Euclid are known to every school child, but Plato' academy, too, helped to create a philosophical-systemic framework for the mathematical and geometrical sciences. The essential

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877 Ernst Cassirer, Einstein's Theory of Relativity, in Ernst Cassirer, Substance and Function, and Einstein's Theory of Relativity, Chicago; London: The Open Court Publishing Company 1921, p. 430–445.

878 C.J. Scriba, P. Schreiber, 5000 Jahre Geometrie, Heidelberg 2010, p. 6f.

importance of *Euclid's* famous "*Elements*" that is organized into thirteen "books" and is one of the world's most published books is primarily due to its style of presentation that has always fascinated and inspired great minds, among them Descartes. It not only presents elementary problems of geometry and defines theorems but also defines certain fundamental categories (axioms, explanations, and postulates) and, then, builds on these definitions to make step-by-step problem-solving transparent right up to its culmination in the final "quod erat demonstrandum" (Q.E.D.).[879] It is this "confident methodical procedure," this demonstrative mode of starting with defining the simple elements of geometry in terms of axioms and, then, building on them to systematically erect the scientific edifice of geometry that became the model for *rationalist philosophy*:

"*Some of these definitions reduce derived concepts to basic concepts in a way that is also common in modern logic, e.g. Def. I,17: 'A diameter of the circle is any straight line drawn through the center and terminated in both directions by the circumference of the circle, and such a straight line also bisects the circle;' Def. I,23: 'Parallel straight lines are straight lines which, being in the same plane and being produced indefinitely in both directions, do not meet one another in either direction.' Others try to describe a basic concept, e.g. Def. I,1: 'A point is that which has no part.' Def. I,2: 'A line is breadthless length.'*"[880]

For me, these definitions are interesting not so much from a mathematical or theory-of-science point of view but because of their role in *visual thinking*. Let's take the two last definitions, for example: "A *point* is that which has no part." And: "A *line* is breadthless length." These two are especially remarkable because without visual thinking no such definition could ever be formulated: on the one hand, I first need to understand and know what "a point" is supposed to be at all when, for instance, I put a stick in the sand as a point of orientation. I have thus marked a reference point that helps me to draw further lines that depart from it. This reference point, however, obviously occupies space, so even using thinner and thinner sticks would never let me obtain, at least not in the realm of sense impressions, a definition stating that the point has no part! Thus, speaking of a point as an abstract smallest unity that, consequently, cannot have a part although in the real world we permanently refer to certain points (also standpoints and viewpoints!), is an ingenious, for that time, abstraction, just as the definition of the line as breadthless length is, even though this definitions have been criticized as insufficient by logicism.

Nevertheless, these definitions already indicate the "dualistic" nature of geometry, for while *visual thinking* needs sensory perception to access the geometrical doctrine at all, the doctrine itself builds on *constructive*

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879 Andreas Filler, Euklidische und nichteuklidische Geometrie, Mannheim 1993, p. 53.

880 C.J. Scriba, P. Schreiber, 5000 Jahre Geometrie, Heidelberg 2010, p. 51.

*imagination* and abstraction, e.g. when we use our imagination to visualize the fact that there is only one shortest line we can draw between two points, namely a straight but "*breadthless*" one. Yet this definition of a line as "*breadthless length*" is at odds with sensory perception because by this definition, it can always "only" be a *thought* line that has no concrete reality whereas in the "material" world even the finest of drawing utensils will always produce a line with some breadth. The pivotal and, concerning the valuation of Euclidean and non-Euclidean geometry, most important here is that in curved space the "true" line will probably always be curved and, what is more, be curved differently at different points, and that in space (not on a plane) there may actually be no such thing at all as a really straight line (with the type and the extension of the curvature in space probably remaining ultimately undefinable), but that *in our imagination* the shortest line we use to connect two points will *always be a straight one*. Even if *in our imagination* we draw a line between two points through a sphere, this imagined line will always be a straight and never a curved one! So, in this sense, Kant is perfectly right when he speaks of *pure a priori intuition* as the realm where we *construct* geometrical figures, for this is the "drawing board" that nature has provided us with and which is primarily Euclidean and *not* non-Euclidean. What we can do, however, guided by reason and never by "sense experience," is enhance the "drawing board" and, thus, make it non-Euclidean, as well.

This argumentation is also the one Descartes uses when he reflects, in his Sixth Meditation, on the fact that we may be able to imagine a five- or a six-sided figure, but surely not a chiliagon:

"*To make this clear, I will first examine the difference between imagination and pure understanding.*"[881]

This point is of eminent importance because Descartes, in accordance with Kant, clearly demarcates imagination from "*pure understanding*." This means that we can imagine geometrical constructions such as, for instance, combinations in chess by drawing on our power of imagination but that this imagination will not arbitrarily generate bizarre zigzag lines – which would, of course, be possible – but operate in so orderly a way that logical *visual thinking* becomes possible, without which we could never successfully work out problems either in geometry or in chess. Thus, in geometry as well as in targeted thinking in chess, we need to "interpose" a third component, namely *visual thinking* as postulated by the visual turn. But let's follow Descartes at this point:

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[881] René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 50.

"*When I imagine a triangle, for example, I do not merely understand that it is a figure bounded by three lines, but at the same time I also see the three lines with my mind's eye as if they were present before me; and this is what I call imagining.*" (loc. cit.)

Thinking and representing in the imagination thus happen "at the same time," which is very important for our subject. Incidentally, it is also interesting that Descartes refers to "my mind's eye," thus expressing himself like Plato did ("*with the eyes of the mind*") and, what is more, making it quite clear that what he sees in his imagination is a figure. But now Descartes comes to his crucial conclusion concerning the chiliagon:

"*But if I want to think of a chiliagon, although I understand that it is a figure consisting of a thousand sides just as well as I understand the triangle to be a three-sided figure, I do not in the same way imagine the thousand sides or see them as if they were present before me. … But suppose I am dealing with a pentagon: I can of course understand the figure of a pentagon, just as I can the figure of a chiliagon, without the help of the imagination; but I can also imagine a pentagon, by applying my mind's eye to its five sides and the area contained within them.*" (loc. cit., p. 50f.)

Descartes thus differentiates between geometrical figures according to whether or not they can be represented in the imagination, and confirms what Stephen Kosslyn has previously told us about the origin of the images we see in our mind and the difficulty of "retaining" them for more than a few seconds. We recall that the "image build-up" in the imagination developed from saccadic eye movement, which is inherent to the process of seeing, into the power of imagination and that, therefore, permanent re-uploading is required not only for the visual image – in this case, to avoid exhausting the color pigment – but also for the internal images of the imagination:

"*And in doing this I notice quite clearly that imagination requires a peculiar effort of mind which is not required for understanding; this additional effort of mind clearly shows the difference between imagination and pure understanding.*" (loc. cit.)

Here we come to a very interesting point that will be discussed in more detail in the chapter on Descartes, namely that our *power of imagination*, that is, the faculty of representing or *constructing* a triangle or a pentagon in the imagination suffices for these simple figures but ceases to do so when it comes to the form and the relations of a chiliagon since a chiliagon's size and complexity is beyond what the "powers" of the imagination can handle.

Thus, since all the figures, planes, points, and constructions of geometry can never be found in their perfect form in the real world, as previously discussed regarding Plato's example of the circle, it is only in the imagination and in visual thinking that they can ever be perfect – perfect in the sense of Euclidean geometry, that is, with straight lines etc. But, and this is why I'd like to once more quote the admirable passage from

Julius Stenzel: geometry first comes from the individual objects and structures one has seen (from "intuition"), it is of an "only" imagined and "only" *thought* nature and yet, *at the same time*, strictly *universal* and *necessary* (as in the rule laid down in the "*concept*") and always tends to fall back on the figurative representation, for instance a map or a construction plan:

"*Whoever is familiar with the Meno and Phaedo knows Plato's predilection for mathematical figures as a means of demonstrating the participation of the particular in the universal. What characterizes mathematical intuition is that the particular case does not only represent other cases of the same kind but something definitely other, something 'higher,' an immediate certainty. So, there can be no question of abstracting from particular cases; rather, even in archaic thinking mathematical problems will lead to the insight that unless there is something of a higher order, the particular thing cannot be recognized as something 'on which we set this seal' of being 'that which it is,' as Plato says in the Phaedo; and since, on the other hand, archaic thinking is not in the habit of representing this universal – the mathematical in the broadest sense – in terms of concepts, or definitions, as long as visual representation is easy, this thinking always tends to fall back on what is particular and intuitive and, thus, to grasp all at once, at a glance, (…) by an overview, the content of the universal.*"[882]

So, this is not only about this "oscillation" between the individual case, the concrete geometrical figure on paper or on the blackboard, on the one hand, and its universal validity, on the other, this is also about the question of whether these constructions are within the reach of *visual thinking* or can only be solved by means of linguistic or algebraic techniques. For *visual thinking* must at least suffice to perform relations and operations on and with these imaginable simple figures. This question is interesting insofar as geometry, starting with the transformations of analytic geometry as created by Descartes and its set-theoretic grounding by Dedekind, Cantor, and Hilbert, has been largely mathematized, and especially so in the last one hundred years:

"*By increasingly working with formulas rather than geometrical figures and geometrical arguments, we have spectacularly enhanced performance but, at the same time, become more and more estranged from the facts underlying the formulas. And while the final result of this type of computation can, of course, be re-interpreted in geometrical terms, the intermediate steps are in most cases lost.*"[883]

This "estrangement" between intuitive, "visual" geometry and arithmetically expressed figures and structures is interesting because while intermediate steps, it is true, can no longer be *intuitively* understood, the final result of the formula can at least be re-interpreted in geometrical terms. In

882 Julius Stenzel, Über den Aufbau der Erkenntnis im VII. Platonischen Brief, in: Kleine Schriften zur griechischen Philosophie, Darmstadt 1956, p. 14.

883 C.J. Scriba, P. Schreiber, 5000 Jahre Geometrie, Heidelberg 2010, p. 344.

a way, this calls to mind the situation previously outlined for chess programs: where human players used to sit pondering over chess boards with elaborately carved pieces, and observers used to be able to re-construe every move, games today happen on microprocessors and in computer languages, and while such a game can of course be made graphically visible on a monitor, the whole goings-on definitely differ from those of a "real" game between human beings. Poincaré's insight concerning the formalization of geometry still holds true: what is gained in formalism is lost in real-life concreteness "*from the human standpoint*" (Kant).

## Criticism of Kant's doctrine of Euclidean geometry and three-dimensional space as set forth in his Transcendental Aesthetic

In this context, a brief historical review of the attacks initiated by EAN and, primarily, Bertrand Russell against Kant's doctrine of space and, by association, Euclidean geometry as the basis of Kant's theory of the three-dimensional intuition of space seems in order. Russell conducted his attacks in his writings on geometry and, primarily, his 1919 work "*An Essay on the Foundations of Geometry*," i.e. at a time when leading German scientists such as Helmholtz criticized Kant on theoretical grounds but nevertheless still remained within the neo-Kantian tradition. The debate focused on the role of *intuition* in Kant, on the one hand, and the position of *Euclidean geometry* that was the scientific basis for Kant's theory of the intuition of space, on the other. Jesse Norman describes the situation as follows:

"*The philosopher who is perhaps most closely associated with positive claims for a faculty of intuition is Kant, and the influence of Euclid's geometry on the Critique of Pure Reason is well known. In the 'B' Preface, Kant describes the main goal of his work as'an attempt to transform the accepted procedure of metaphysics, undertaking an entire revolution according to the example of the geometers and natural scientists.' In the Transcendental Aesthetic he takes the status of geometry as a synthetic a priori description of space to be an 'apodeictic certainty'. And in the Doctrine of Method he gives a worked example of someone following an argument in Euclid to illustrate his doctrine that intuition of a diagram or figure is required for geometrical knowledge. (Bxxii; B64ff; B744) Kant's belief that Euclid's geometry is the science of space is, of course, widely held to be untenable. But many commentators have also been dismissive of his claims about geometrical reasoning. The discovery of logical gaps in Euclid, many of them traceable to the lack of axioms giving an explicit theory of order for points in the line, has served to undermine Euclid's claim to rigor. And a further worry is that Kant, while doubtless familiar with the mathematics issuing from Descartes'* Géometrie *did not foresee the degree to which the later development of analytic geometry would undermine the view of intuition described above.*"[884]

[884] Jesse Norman, After Euclid – Visual Reasoning & the Epistemology of Diagrams, CSLI Publications, Stanford 2006, p. 7.

Norman here offers a very stringent outline of both Kant's position and the typical EAN attacks, more specifically those following Bertrand Russell's offensive at the time of World War I, when he became more oriented to the English empiricist tradition. Thus, Norman quotes one of Russell's key arguments at that time:

"*Formerly, it was held by philosophers and mathematicians alike that the proofs in Geometry depended on the figure; nowadays, this is known to be false. In the best books there are no figures at all. The reasoning proceeds by the strict rules of formal logic from a set of axioms laid down to begin with. If a figure is used, all sorts of things seem obviously to follow, which no formal reasoning can prove from the explicit axioms, and which, as a matter of fact, are only accepted because they are obvious. By banishing the figure, it becomes possible to discover all the axioms that are needed; and in this way all sorts of possibilities, which would otherwise have remained undetected, are brought to light.*"[885]

In his comprehensive condemnation of all *visual* elements, Russell went so far as to contest even the truth of Euclid's arguments precisely *because* the argumentation also builds on diagrams. Norman then quotes a modern source, Alberto Coffa, who, rather in line with the aggressive-supercilious EAN style, assimilates the visual element in geometry to a form of cancer:

"*…has already understood that intuition is not an indispensable aid to mathematical knowledge, but rather a cancer that has to be extirpated in order to make mathematical progress possible.*"[886]

Basically, the debate between EAN and rationalism, or Neo-Kantianism, about Euclidean geometry consists of several and, depending on the issue at hand, partly overlapping threads. Andreas Filler offers a very impartial and sober outline of the initial problem:

"*However, with the emergence of non-Euclidean geometries, the question at once arose whether these could provide a more adequate description of real space than Euclidean geometry could. Lobachevski had already tried to answer this question by measuring the sum of the angles of a triangle with two corner points at opposite points of the earth's orbit and the third one at a fixed star (Sirius). The deviation of his measurement from the value of 180° was, however, below the measurement error limit. Thus, one of the problems associated with the question of which geometry describes our real space is the fact that on the 'small scale,' both elliptic and 'hyperbolic' geometry do not differ from Euclidean geometry and that due to the immense size of our universe, even the distance between the earth and a fixed star is still 'small-scale.'*

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885 Jesse Norman, After Euclid – Visual Reasoning & the Epistemology of Diagrams, CSLI Publications, Stanford 2006, p. 8; Bertrand Russell, Mathematics and Metaphysicians (1901), p. 93.

886 Jesse Norman, After Euclid – Visual Reasoning & the Epistemology of Diagrams, CSLI Publications, Stanford 2006, p. 9; Alberto Coffa, 1982, Kant, Bolzano and the Emergence of Logicism. Journal of Philosophy 79.

*The question of which geometric system describes the structure of the universe can be reduced to the question of the curvature of real space. If the curvature of this space were zero everywhere, it would be a Euclidean space; if the curvature were constantly positive or negative, real space would be described by elliptic or hyperbolic geometry, respectively. The real conditions, however, are far more complicated since even the constancy of the curvature of real space can by no means be assumed as a fact. Thus, the possibility needs to be considered that the curvature of space is different at different points and that, therefore, geometrical conditions, too, may differ at different points of space. These problems alone already illustrate the extreme complexity of the question of the geometrical structure of our universe. This complexity was even enhanced by the insight of the theory of relativity that the space of reality cannot be separated from time.*"[887]

The problem therefore is that, on the one hand, space may well be curved in *different ways* at *different* points, which makes it extremely difficult to decide which form of non-Euclidean geometry to apply at which point to describe space. Moreover, with respect to the human-practical sphere on earth and in near-earth space – human limbs, tools, housebuilding, engineering, and actually all technical activities, GPS systems, etc. –, the deviation due to the curvature of space is completely negligible, so for these practical purposes, *Euclidean geometry* is in accord with the non-Euclidean form of space and obviously completely sufficient and adequate for man as well as nature. Only when it comes to computing flight trajectories, or in space travel and astronomy, non-Euclidean procedures are, of course, indispensable. That the advances of physics and the discovery of non-Euclidean geometry were soon used as a means of discrediting Kant's doctrine is also mentioned by Felix Kaufmann:

"*Even at the time when Gauss, Lobachevsky, Boliay, and Riemann first ventured to propose non-Euclidean geometries without, however, applying them to physics, there was the assertion that these geometries were in contradiction with Kant's philosophy. This view is certainly incorrect. Provided that it is possible to prove the consistency of non-Euclidean geometries, these geometries have only shown that the Euclidean parallel postulate is not a logical consequence of the other postulates of geometry. But Kant never claimed that a geometry other than Euclidean was inherently contradictory. Rather, by differentiating between synthetic a priori judgments and analytic judgments, he had explicitly ruled out this view*."[888]

That Kant built on the known geometry of his time does not detract from his transcendental system. But what about Einstein's theory of relativity where space and time are not separated? Here, Kaufmann argues:

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887 Andreas Filler, Euklidische und nichteuklidische Geometrie, Mannheim 1993, p. 230.

888 Felix Kaufmann, Cassirers Wissenschaftstheorie, in: Paul Arthur Schilpp (ed.), Ernst Cassirer, Stuttgart 1966 (Kohlhammer), p. 124f.

"*Kant's claim that Euclidean geometry is the a priori condition of physics is indeed incompatible with Einstein's general theory of relativity. But the question is whether this fact, in conjunction with another one – namely that in Einstein's theory, space and time cannot be separated from each other if this theory is not to lose its character of physical objectivity -, really gets down to the roots of Kant's philosophy. Cassirer shows that both facts have no effect on the foundations of transcendental philosophy*." (loc. cit.)

More or less following Cassirer's argumentation, Kaufman comes to the following conclusion:

"*But the general theory of relativity does in no way invalidate the principles of Kant's transcendental philosophy. Stripped of its era-specific elements, the critical method remains valid.*" (loc. cit., p. 126)

A completely different line of argumentation starts out from the fact that the forms of Euclidean geometry are *innate* – as manifest in the gestalt laws of perception –, which suggests that for millions of years, they have obviously passed the "pressure test" of evolution on earth. But what is even more important is the fact that *in our imagination*, we can only ever draw *a straight line* as the *shortest way* to connect two points, we cannot draw a line that is slightly curved, let alone a line with different curvatures at different points. This is to say that in our *figurative imagination*, in the eyes of our mind – and I don't see any other way of thinking this –, the shortest connection between two points is always a straight line. Even when we imagine a sphere and the shortest possible way to connect two points on its surface, we will always draw a straight line *through the sphere's interior.* We will never draw it on the sphere's surface, which would be very hard to do in the imagination and, what is more, would not be the shortest line, to begin with! This means that there is a discrepancy between the evolutionary-biologically inherited dispositions, our mental "drawing board," the *gestalt laws* that build on them, and the practical-technical activities of us "earthlings," on the one hand, and the insights of modern space physics and the theory of relativity, on the other. The question now is whether these two *forms* of geometry will necessarily "clash," whether one is necessarily "truer" than the other – to provide positivism with some convenient arguments in its war against rationalism –, whether they are incompatible or whether they might actually have different functions and practicalities depending on the *respect* in which the question is raised. Since non-Euclidean geometry was developed by mathematicians who had "grown up" with Euclidean geometry, it would seem obvious, as Poincaré writes, that it is a further development from Euclidean geometry as the "*most useful*" form of geometry with curvature zero to a highly complex non-Euclidean geometry. Poincaré famously demonstrated this "translatability" of Euclidean into non-Euclidean geometry by simply

translating, dictionary-like, the expressions of Euclidean geometry into those of non-Euclidean geometry.[889]

From Poincaré's point of view, the question of whether Euclidean geometry is "true" does not really make sense:

"*One geometry cannot be truer than another; it can only be more useful. Euclidean geometry is now and will remain the most useful geometry: …*"

This, Poincaré emphasizes, is so because of our mental habits but, most of all,

"*[b]ecause it agrees rather well with the properties of natural solids, those bodies akin to our limbs and our eyes and with which we fashion our measuring instruments.*"[890]

In this context, Poincaré, one of the most brilliant mathematicians of all times, not only refers to Lie Transformation Groups but even brings in another very important aspect:

"*It has often been said that, although individual experience cannot have created geometry, the same is not true of ancestral experience. What does this mean? Do we mean that we cannot demonstrate Euclid's postulate experimentally, yet our ancestors were able to do so? Not in the least. We mean that, through natural selection, our minds have adapted to the conditions of the external world, that they have adopted the geometry most advantageous to the species or, in other words, the most useful. This is in complete agreement with our conclusions: geometry is not true, it is advantageous.*"[891]

In plain terms, this is what Poincaré says: given terrestrial conditions, the geometry which is most useful for us became innate to us because it had shown to be evolutionarily "*advantageous.*" Einstein's position in this respect is no less pragmatical, a fact which tends to be overlooked:

"*If we reject the relation between the body of axiomatic Euclidean geometry and the practically-rigid body of reality, we readily arrive at the following view, which was entertained by that acute and profound thinker, H. Poincaré: Euclidean geometry is distinguished above all other conceivable axiomatic geometries by its simplicity. Now since axiomatic geometry by itself contains no assertions as to the reality which can be experienced, but can do so only in combination with physical laws, it should be possible and reasonable—whatever may be the nature of reality—to retain Euclidean geometry. For if contradictions between theory and experience manifest themselves, we should rather decide to change physical laws than to change axiomatic Euclidean geometry. If we reject the relation between the practically-rigid body and geometry, we*

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889 Henri Poincaré, Science and Hypothesis, (1902) 1917, accessed at: Bloomsbury Academic 2018, p. 38; see also: Klaus Volkert, Das Undenkbare denken, Berlin/Heidelberg 2013, p. 229.

890 Henri Poincaré, Science and Hypothesis, (1902) 1917, accessed at: Bloomsbury Academic 2018, p. 43.

891 Henri Poincaré, Science and Hypothesis, (1902) 1917, accessed at: Bloomsbury Academic 2018, p. 68.

*shall indeed not easily free ourselves from the convention that Euclidean geometry is to be retained as the simplest*."[892]

With this, we have again reached an important point. In the course of evolution, Euclidean geometry became an integral part of our cognitive structures, of *gestalt laws* and the functions of the *imagination*, it is our *natural* form of geometry and, thus, consistent with the three-dimensional form of our intuition of space as described by Kant.[893] Non-Euclidean geometry may be more adequate, "more realistic," for any description of conditions in outer space, but for us humans it is, as Poincaré and Einstein emphasized, an "unnatural" and arduous form of geometry which, if we had to rely on it as the natural basis of our practical life, would make it very difficult for us to orient ourselves on earth. For once, ironically, it is "experience" that, "*from the human standpoint*," argues for sticking to Euclidean geometry in normal everyday life.

This argument is highly interesting for the issue at hand because it marks the very point that has led to a certain confusion between various schools of thought and interpretation, largely due to a failure to understand that there really is such a thing as autonomous *visual thinking*. The reason is to be sought in Kant himself since in his doctrine, there is only *intuition* and *concept* as the polar points of cognition, that is, a strict separation between the "*visual image*" and language notwithstanding the fact that between these poles, there is an observable faculty of visual thinking as a form of intelligence that goes well beyond pure imagination! As a consequence, not only Kant himself, but virtually all his commentators find it hard to come to a precise definition of the concept of "*Anschauung*" – "intuition." Also, in English, there is the additional dilemma that Kant's "Anschauung" is translated as "intuition," which also describes the immediate *intuitive insight* that allows us to *all at once* apprehend connections in mathematics, "*to grasp these insights*," as the saying goes. At any rate, according to Kant, the logical consequence is a systemic need for *schematism* to "give concretion" to these synthetic a priori insights that lead to the solution of, e.g., a mathematical operation. For Kant, "*Anschauung*" – "intuition" – plays such a key role in both geometry and mathematics because one of the basic guiding principles of his entire critical doctrine is to maintain, at all events and all times, the link to reality, the real-world objects, to experience, and, thus, to rule out reasoning for reasoning's sake, segregated from experience. This also holds for constructions in geometry that are imaginable already in *pure intuition* and, at

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892 Albert Einstein, Geometry and Experience, Lecture before the Prussian Academy of Sciences, January 27, 1921. The last part appeared first in a reprint by Springer, Berlin, 1921 (accessed at: http://pascal.iseg.utl.pt/~ncrato/Math/Einstein.htm

893 Cf. Henri Poincaré, Pourquoi l'espace a trois dimensions, in: Henri Poincaré, Dernières Pensées, Paris: Flammarion (1913) 1917.

this initial stage, do not need schematism at all, except of course where geometry has been algebraized. Kant then famously uses the simple addition of 7 + 5 = 12 to step by step demonstrate the crucial role that intuition, that is, actual intuiting, plays in mathematics:

"*To be sure, one might initially think that the proposition '7 + 5 = 12' is a merely analytic proposition that follows from the concept of a sum of seven and five in accordance with the principle of contradiction. Yet if one considers it more closely, one finds that the concept of the sum of 7 and 5 contains nothing more than the unification of both numbers in a single one, through which it is not at all thought what this single number is which comprehends the two of them. The concept of twelve is by no means already thought merely by my thinking of that unification of seven and five, and no matter how long I analyze my concept of such a possible sum I will still not find twelve in it.*"[894]

There is no understanding Kant's argument here unless, in the self-experiment, we strictly distinguish between the (literal) *concept* of the number and a possible intuition and cancel out any addition we have learned to do by training. Kant goes on:

"*One must go beyond these concepts, seeking* assistance in the intuition *that corresponds to one of the two, one's* five fingers, *say, or (as in Segner's arithmetic)* five points, *and* one after another *add the units of* the five given in the intuition *to the concept of seven. For I take first the number 7, and, as I take the fingers of my hand as an intuition for assistance with the concept of 5, to that image of mine I now add the units that I have previously taken together in order to constitute the number 5 one after another to the number 7, and thus see the number twelve arise.*" (loc. cit., my emphasis)

If we start with using the mere *concepts* of the number word "7" and the number word "5", bringing together these two words will not enable us to carry out an addition; and the larger the numbers – i.e. numbers whose addition we have not internalized by rote learning in childhood – the more compelling this insight, as Kant later notes. Only *visualizing* the number 5 by *schematization* – units in terms of five fingers or *five points* (which is the example used by Kant in the chapter on schematism) –, that is, translating the concept of the number 5 into something "*given in the intuition*" and adding these units "*one after another to the number 7*," will allow us to "*thus see the number twelve arise*"! This "*one after another*" is important here because it obviously refers to a visual ("*that image of mine*") process in time that has been internalized by rote learning and, thus, appears to be an automatism, while "*arise*" seems to denote a *synthetic-creative act* – aha!, so now we have twelve! These mechanisms also provide the basis for calculation machines such as the abacus, with the wood-

[894] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 144 (B 16).

en beads translating the underlying visualization mechanism into something concrete.

Kant then goes on to extend the idea of visual construction to *algebra* which he conceives of, fundamentally and in spite of all its abstraction from concrete size or magnitude, as a logical-synthetic construction that is ultimately reducible to intuition and can never be obtained from concepts alone:

"*But mathematics does not merely construct magnitudes (quanta), as in geometry, but also mere magnitude (quantitatem), as in algebra, where it entirely abstracts from the constitution of the object that is to be thought in accordance with such a concept of magnitude. In this case it chooses a certain notation for all construction of magnitudes in general (numbers), as well as addition, subtraction, extraction of roots, etc., and, after it has also designated the general concept of quantities in accordance with their different relations, it then exhibits all the procedures through which magnitude is generated and altered in accordance with certain rules in intuition; where one magnitude is to be divided by another, it places their symbols together in accordance with the form of notation for division, and thereby achieves by a symbolic construction (of the objects themselves), which discursive cognition could never achieve by means of mere concepts.*"[895]

In simple words: where geometry constructs its "objects" in logical-synthetic steps, mathematics creates a letter or a sign for *magnitude* or *quantitas* (whose inclusion was set forth in the Transcendental Analytic, the axioms, the anticipations, etc.) and operates with these magnitudes which in turn, in the final analysis, symbolize *intuitive* relations! Taking the equation x = a / b as an example, Lisa Shabel discusses this kind of *intuitive* relations that can also be represented *more geometrico* as a size ratio.[896] The logical principle of "division" remains unaffected by this, as well as the process of *how* we have synthetically extended our knowledge beyond the concepts of "four," "two," and "division." All of Kant's reflections in this context are based, as previously noted, on the *strict separation* between intuition and concept, which also results in our "twofold use of reason," namely, discursive-conceptual and intuitive-constructive.[897]

The reference to *visual* – or "*ostensive*," as Kant sometimes calls it – *representation* is even more obvious in *pure intuition* in geometry:

"*Just as little is any principle of pure geometry analytic. That the straight line between two points is the shortest is a synthetic proposition. For my concept of the straight contains nothing of quantity, only a quality. The concept of the shortest is therefore*

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[895] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 632 (B 745).

[896] Lisa Shabel, Kant on the 'Symbolic Construction' of Mathematical Concepts, Studies in History and Philosophy of Science, 1998 Part A 29 (4), p. 613.

[897] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 633 (B 747).

*entirely additional to it, and cannot be extracted out of the concept of the straight line by any analysis. Help must here be gotten from intuition, by means of which alone the synthesis is possible.*"[898]

It's the same argument all over: the mere concept (word) "line" alone does not tell us how long or how short this line is, nor that it is also the shortest connection between two points, all of which "*cannot be extracted out of the concept of the straight line by any analysis*." Intuition, however, at once enables us to verify that the straight line is indeed the shortest connection between two points on a plane. Two things should be noted here. Firstly, in this *example*, Kant takes the space of Euclidean geometry as a basis (thus providing a starting point for 20th-century criticism), which, however, does not per se detract from the explanatory power of the example (concept versus intuition). For when we imagine the shortest connection between two points on a curved surface, mere concepts do not suffice either, we always need to resort to intuition to help us visualize the curved line. Or, in Kant's words:

"*We cannot think of a line without drawing it in thought, we cannot think of a circle without describing it, we cannot represent the three dimensions of space at all without placing three lines perpendicular to each other at the same point, …*" (loc. cit., B 154)

Our second observation again concerns the sharp separation between *concept* and *intuition*. For according to Kant, "*intuition*" is by definition not thinking but the *immediate "visual image" of the individual, particular object*. And up to a certain point, this process is, of course, mere imagining, made possible by our power of imagination, such as, for instance, the drawing of a line in time. But all these simple operations are not yet conceptual reasoning, they are visual acts of comparing, identifying, mirroring figures, using symmetries, bisecting and doubling surfaces or lines, all of which is much more than intuition but still not conceptual reasoning. This synthetic a priori mode of gaining new insights is *visual thinking* with, at this initial stage, no need for conceptual reasoning. A more in-depth evaluation of this border area will be undertaken in the chapter on Kant. As for the controversy with EAN, Kant's doctrine is clearly still defensible, even though it is somewhat unwieldy and requires a certain amount of explaining. By and by, however, the position of rationalism will be substantially strengthened by new aspects such as the innateness of the Euclidean forms of gestalt theory, or Lie Transformation Groups, the evolutionary-biology aspect, and the insight that besides and between intuition and concept, there is *visual thinking* without language. Michael Friedman comments:

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[898] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 145 (B 17).

"*Geometry is synthetic precisely because its underlying axioms are synthetic; the (synthetic) theorems of geometry follow purely logically or analytically. This anti-Russellian view is clearly and forcefully stated by Beck:*
*'The real dispute between Kant and his critics is not whether the theorems are analytic in the sense of being strictly logically deducible, and not whether they should be called analytic now when it is admitted that they are deducible from definitions, but whether there are any primitive propositions which are synthetic and intuitive. Kant is arguing that the axioms cannot be analytic . . . because they must establish a connection that can be exhibited in intuition.'*
*As Beck indicates, this view is attractive because Kant will not be refuted, as Russell thought, by the mere invention of polyadic logic. (…) Indeed, from this point of view, the discovery of logically consistent systems of non-Euclidean geometry should be seen as a vindication of Kant's conception. The existence of such geometries shows conclusively that Euclid's axioms are not analytic and, therefore, that no analysis of the basic concepts of geometry could possibly explain their truth (as Leibniz apparently thought).*"[899]

We have already argued that in his attack, Bertrand Russell underestimates the fact that in the final analysis, fundamental elements of the logical axioms and theorems cannot be effectively grounded without visualization. Interestingly, Gottlob Frege, one of the "apostles" of the movement of analytic philosophy, is rather more ready to agree with Kant in this respect, namely that intuition indeed has a role in geometry:

"*We shall do well in general not to overestimate the extent to which arithmetic is akin to geometry. I have already quoted a warning to this effect from Leibniz. One geometrical point, considered by itself, cannot be distinguished in any way from any other; the same applies to lines and planes. Only when several points, or lines or planes, are included together in a single intuition, do we distinguish them. In geometry, therefore, it is quite intelligible that general propositions should be derived from intuition; the points or lines or planes which we intuit are no really particular at all, which is what enables them to stand as the representatives of the whole of their kind. But with the numbers it is different; each number has its own peculiarities*."[900]

It is altogether much too rarely noted that the allegedly rigid unitary-logicistic credo of analytic philosophy has always been rather inconsistent in its conception of geometry, not unlike what we have seen with respect to other issues such as, for instance, Platonism. Concerning the questions raised above about Kant's doctrine of Euclidean geometry, three-dimensional space, the transcendental-idealist aesthetic of space and time, and the synthetic a priori nature of our judgments in mathematics and

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899 Michael Friedmann, The Philosophical Review, Vol. 94, No. 4 (1985), p. 487. Friedmann quotes Lewis White Beck: Can Kant's Synthetic Judgments Be Made Analytic? In: Kant-Studien 47, 1955, p. 168–181.

900 Gottlob Frege, The Foundations of Arithmetic: A Logico-Mathematical Enquiry Into the Concept of Number (1884), 2nd revised edition, Basil Blackwell 1989, p. 19f.

geometry, there are two excellent presentations, or, rather, rectifications that also extend to the developments and proposals of Neo-Kantianism. These are "*Kant's Theory of Science*" by *Gordon Brittan* and "*After Euclid*" by *Jesse Norman*. Both authors follow Kant's arguments and intentions but take care not to pervert or twist them and also see the need for up-to-date adaptations. So, let's start with Gordon Brittan's more strategic analysis and, then, proceed to Jesse Norman's more tactical arguments:

"*One well entrenched view of Kant's philosophy of mathematics is as follows. Kant took Euclidean geometry as the paradigm of mathematical reasoning. However, neither in Euclid's own time nor in Kant's could all of Euclid's proofs be carried out without the use of geometrical constructions. So Kant was led to insist on the centrality of geometrical constructions or, in his preferred vocabulary, 'intuition' in mathematical reasoning. Yet further developments – principally the formalization techniques associated with the name of Hilbert – reveal that constructions are inessential from a logical point of view. Moreover, Kant's emphasis on the synthetic a priori character of mathematical propositions stems from his failure to distinguish clearly, as his successors have done, between pure and applied mathematics. Pure mathematics is analytic, hence a priori as well, but applied mathematics is synthetic. Therefore, Kant's views are at best out-moded and old-fashioned.*"[901]

After this very stringent presentation of the most common objections, Brittan discusses them one by one. First, he addresses the "*Frege-Russell reduction of mathematics to logic*" and, drawing on Kant's explanations of synthetic a priori judgments, points out that the view held by *Leibniz* and adopted by Frege and Russell, i.e. that all you need for solving mathematical problems is the principle of contradiction, is wrong since it implies that all mathematical sciences including geometry are purely analytical operations (B 14). Kant, in contrast, takes the view that *synthetic inferences*, too, must "*proceed in accordance with the principle of contradiction*" and that synthetic propositions could also be deduced from one another but had of necessity to be grounded in the *intuition* if we wanted to *go any further*. He explains this by taking as an example, already discussed above, the addition 7 + 5 = 12. Brittan then notes that the Frege-Russell program of reducing mathematics to logic was consistently implemented but that this is also the very reason why it remained committed to the Leibnizian argumentation, which was precisely what Kant sought to overcome.

Next, Brittan discusses the "Beth-Hintikka reconstruction" that is primarily based on Kant's chapter "*The discipline of pure reason in dogmatic use*", i.e. B 740 to, roughly, B 763, and the "*Lambert-Parsons reconstruction*" where the argumentation focuses on the suggestion that synthetic a priori judgments make an "*existential claim*." Starting out from this ap-

[901] Gordon Brittan, Kant's Theory of Science, Princeton University Press, New Jersey 1978, p. 43.

proach, Brittan takes Euclidean geometry as an example of his decisive connection:

"*Following Kant, let us take Euclidean geometry as our mathematical paradigm. An axiomatic formulation of Euclidean geometry, far from undermining Kant's view, allows one to see in a very sharp way the existential character of geometry. In Euclid's Elements, where the axioms are set down in the form of principles of construction, this existential character is obscured by the pictorial aspect of proof. The fundamental point, however, is that in carrying out constructions we are asserting the existence of mathematical individuals. And it is principally in virtue of this fact that mathematical proofs and propositions are synthetic. That all intuitions (in this case, mathematical individuals) are, for us human beings, necessarily sensible (a result of the Aesthetic and not a corollary of the definition of 'intuition') explains how and in what sense the propositions of mathematics are evident, and hence supplies an additional reason for saying that they are synthetic.*"[902]

This is an important reflection that already brings us closer to Brittan's principal, and decisive, argument in favor of the validity of Kant's doctrine. When we carry out constructions of geometry by, first, logically and synthetically a priori conceiving them as real in our imagination and, then, representing them figuratively (in both their intuitive and logical character!), or when we, as previously discussed, use visual means as an aid to synthetically grasp an addition, for instance, the link to what really exists, to reality – to concreteness, as Hegel would say – is always implied as an essential element, which is precisely what is lacking, or at least assumed to be eliminated, in apparently pure axiomatic logicism. Merit is due to Poincaré, the mathematical genius of the early 20th century who strongly built on Kant, to have undermined Russell's claim to a completely presuppositionless and pure axiomatic and, thereby, exposed this sore spot of all formalistic systems and providing the anchor point for Gordon Brittan to build on. Elie Zahar, in a very carefully conducted methodical review of the logical content of Poincaré's and Russell's respective argumentations, describes the contrast between them in no uncertain terms:

"*In Logic, we can rely only on our intuition to tell us which of our axioms are at fault and how they are to be modified; which is precisely the point made by Poincaré. In other words, it is only against some provisionally fixed logical background that hypothetico-deductivism works. … Russell had thus maneuvered himself into an impossible situation. He could of course have given up logicism and presented the Principia as a description of a possible Platonic universe. Like Frege, he had once been a Platonist and was not therefore committed to regarding logic as an empty system applying indifferently to all worlds; but Poincaré had in effect offered him a better alternative, a kind of honourable retreat. As mentioned above, Poincaré looked upon certain axioms like those of Choice and of Infinity as synthetic apriori propositions; and he had been*

[902] Gordon Brittan, Kant's Theory of Science, Princeton University Press, New Jersey 1978, p. 57.

*essentially right in that the Axiom of Choice is a quasi-logical principle based on the use of the indefinite article in many natural languages*."[903]

With respect to Russell's method, Zahar concludes:

"*These passages express the whole of Russell's – clearly inductive – methodological creed. But given this standpoint, the word 'logicism' becomes an abuse of language whose continued use borders on intellectual dishonesty; for the concept of logic evokes that of truth in all possible worlds, a notion which applies to no synthetic hypothetico-deductive System; for the latter can in principle be falsified by the refutation of any one of its consequences, be this refutation intuitive or experimental. Poincaré rightly maintained that for a logicist to be involved in contradictions is tantamount to receiving a death sentence. The notion of an inductive or of a hypothetico-deductive logical theory moreover constitutes a category mistake; for as just explained, such a System is judged by its consequences.*" (loc. cit.)

Zahar then turns to a statement by Rudolf Carnap where the latter asserts that mathematics is a branch of logic and, therefore, tautological, and that the propositions of mathematics are analytic. Zahar comments:

"*It should be noted that Carnap wrote these lines in 1930-1931, nearly twenty years after Poincaré's death. It was as though the Poincaré-Russell debate which culminated in the recognition – by both protagonists – of the synthetic character of mathematics, had never taken place.*"[904]

Thus, the flaw in Russell's position was simply glossed over by Reichenbach and absorbed by the EAN dogma. As Zahar literally states, "*the word 'logicism' becomes an abuse of language whose continued use borders on intellectual dishonesty.*" Nothing further need be said.

To further explain the argument of the *real existence* of logical and mathematical propositions, Brittan now quotes an important passage from the *Critique of Pure Reason* (B 268):

"*That in such a concept no contradiction must be contained is, to be sure, a necessary logical condition; but it is far from sufficient for the objective reality of the concept, i.e., for the possibility of such an object as is thought through the concept. Thus in the concept of a figure that is enclosed between two straight lines there is no contradiction, for the concepts of two straight lines and their intersection contain no negation of a figure; rather the impossibility rests not on the concept in itself, but on it construction in space, i.e., on the conditions of space and its determinations; but these in turn have their objective reality, i.e., they pertain to possible things, because they contain in themselves a priori the form of experience in general*."

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[903] Elie Zahar, Poincaré's Philosophy – From Conventionalism to Phenomenology, Open Court Carus Publishing Peru IL 2001, p. 176f.

[904] Elie Zahar, Poincaré's Philosophy – From Conventionalism to Phenomenology, Open Court Carus Publishing Peru IL 2001, p. 187.

This reasoning by Kant now provides the starting point for Brittan to come to the central topic of his argumentation, namely a reflection on what is "*really possible*." Kant's entire conception of the *Critique of Pure Reason* as a *philosophy of experiences as well as of mathematics and geometry* remains irrevocably linked to what is "*really possible*," to the *reality that is objectivized by us*. Thus, while Russell accuses German idealism – and ultimately also Kant – of creating a "*veil of ideas*" that separates us from the reality of things, the very opposite is true. It is Kant who is adamant in insisting that, provided the principle of contradiction is respected, even the most abstract mathematical considerations and geometrical constructions must never lose their link to the reality that *we* objectivize, to what is "*really possible*" (whereas EAN logicists get carried away imagining *possible worlds*, n-dimensional spaces, and a pseudo-Platonic "third world"). To have clearly demonstrated this point is one of Gordon Brittan's major merits. He then turns to the debate about Euclidean geometry and modern axiomatic geometries:

"*As noted earlier, Kant does not consider the possibility of construing a mathematical geometry as a system of 'uninterpreted' axioms. He does not have a conception of geometry except as a theory about real or imagined space. (…) Kant wants to say that Euclidean geometry is a priori not only in the sense that it describes a set of possible worlds, but that it is the geometry that describes the set of 'really possible' worlds, that is, worlds that we are capable of experiencing, and a fortiori the actual world.*"[905]

Gordon Brittan then develops a number of subtle arguments against the positivist construal of Kant's doctrine but remains consistently true to his principal argument, namely that Kant never sought to develop an artificial, perfectly consistent, axiomatic system of geometry. What Kant had in mind was a geometry (and Euclidean geometry was the only one known at the time) that could *synthetically a priori*, that is, without "borrowing" from empirical evidence, carry out necessary and universally valid constructions, on the one hand, and not lose the link to reality, to what is "*really possible*," to the life praxis of man, on the other. Construction in the pure intuition, or imagination, becomes pivotal as the ingeniously conceived link between, or common basis of, this amalgamation of synthetic a priori geometry and "real objects" in the intuition of space and time. But, here, it should be noted that the *construction* thus invoked is neither mere *seeing* nor mere *concept*, it is *visual thinking*! And, as a last observation: while throughout his *Critique of Pure Reason* Kant draws on examples from Euclidean geometry, he never – as far as I know – says that Euclidean geometry is the only conceivable form of geometry! Here,

[905] Gordon Brittan, Kant's Theory of Science, Princeton University Press, New Jersey 1978, p. 81.

however, evolutionary biology offers support: while the forms of Euclidean geometry are *innate* to us, n-dimensional spaces are not.

## Visual reasoning in geometry

This preparatory chapter will now address the question of whether geometrical "reasoning," i.e. logical reasoning in geometry – in the step-by-step inference of geometrical proofs, or in problem-solving, or even in the discovery of novel procedures – isn't actually *visual thinking*, with no or barely any linguistic-conceptual components involved. In contrast to authors who argue within the paradigmatic framework of conventional analytic philosophy, our argumentation has the advantage of not having to opt between "*sensory perception*" and "*logical reasoning*" in the classical sense or, in Kantian terms, between *intuition* and *concept*. Assuming a faculty of *visual thinking* that is capable of gaining simple, universal, and necessary insights that go far beyond intuition but are visual rather than language-based would clearly provide us with a much better starting position. After all, we could show that "*sense experience*" is actually a phantom of empiricist philosophy which, epistemically speaking, has insufficient informative power and lacks rational connections and structures in concrete real-world processes and can, therefore, never be an appropriate starting point for explaining a cognitive process in its universality and necessity. We could also show that due to the function of the *laws of gestalt*, the forms of *Euclidean geometry* are *innate* and that therefore, unsurprisingly, Euclidean geometry is and will always be first and closest to us "from the human standpoint." I have further tried to show that there is good reason to assume that, since language as we know it first appeared at about 50,000 BP, there must have been long periods of "non-linguistic" life where early man solved his everyday problems by visual thinking. Taken together, all these considerations show that *visual thinking* should clearly be able to achieve both more than mere "seeing" and imagining and maybe "less" than linguistic-conceptual abstract thinking.

Accordingly, in humans, "reasoning," i.e. logical thinking, in geometry can be supposed to happen as follows: first, one sees the more or less well-drawn geometrical figures and, due to the innate gestalt laws, *imagines* them, relying on the power of the imagination, as closed and perfect in terms of the figures of Euclidean geometry. With this, however, the "intuitive part" of this cognitive step ends. But the *imagination* still does not *think*, it *represents figuratively*. This is when, according to Kant, the *concept* (e.g. of a triangle) comes into play, for it implies the *rule* that defines a triangle: three sides, three corner points, a sum of angles of 180 degrees. With this, however, our knowledge of the triangle is still rather vague. To be able to further define it, we must now grasp the "*simple natures*," that

is, the elementary properties, relations, and functions of the perfect geometrical figure, and this grasping has to be done by *thinking* since *sensory perception* alone, that is, the observation of the triangle from every angle and for hours and even days on end will not do much to enhance our knowledge of it. This grasping, however, can only happen by the *intuitive insight* into the *simple natures* as described by Descartes, and by the step-by-step extension of our knowledge by deduction: aha! this figure has not only three corner points but also three internal angles. Okay, but – aha! there are also the corresponding external angles and, aha! – the sides of this triangle are of equal length while in another triangle, they form a right angle. We believe that we "see" these things, as they say, that we "intuit" them, but since we know that "seeing" will, at most, give us the figure qua gestalt laws but will not allow us to realize its simple *relations* and *properties*, it must be *thinking* of some kind that makes us realize them. But since this is *intuitive insight*, a seeing that is *visual thinking*, it *seems* that no reflective effort is involved in the realization of these simple relations and proportions, we *seem* to simply *perceive* them, just as we intuitively grasp – to refer to the examples used by Descartes – that a sphere has only a single surface or that a triangle has three sides. Still, on closer reflection, all these *simple natures*, that is, points, angles, planes, tangents, symmetries, etc. are nevertheless *thought* and not just *seen* – the result of *visual thinking*.

But obviously, beyond that, there also are all those further connections, relations, and functions – such as, for instance, relations among angles, sums of angles, specific points in the triangle, etc. – that cannot be grasped by intuitive insight into the *simple natures* but only by step-by-step deductive thinking. Here, too, individual steps are managed by *intuitive insight* – you "just see it," as they say, even though this is *visual thinking* – but the construction of the proof or the solution of the problem are nevertheless accomplished by deduction, with language perhaps being used as a complement to reformulate questions and construct or combine hypotheses. Furthermore, we need to ascertain and formulate those *functional* connections of the triangle that may come into play in different *respects* (as previously noted by Ernst Cassirer) as well as in relation to other geometrical figures, i.e. mirroring, rotation, excircles and incircles, specific points, etc. which, as a whole, make up the *concept of function* of the triangle. Again, to once more insist on it: the crucial point in all this is that *sense experience* alone is insufficient by far to let us gain even these simple insights. But Kant, in turn, made it quite clear at every opportunity that our cognition in geometry must always also be "*intuitive*," i.e. remain linked to a real figure, drawn with a pencil or in the imagination! But intuition cannot think. And, what is more, conceptual thinking, if we follow Descartes, is not even necessary when dealing with certain very simple

geometrical connections because we can grasp them *at a glance*, "*at once*," intuitively. So, it would seem that *between* intuition and concept there is a faculty, an "X," that has as yet not been sufficiently described, let alone understood.

For a more detailed discussion of this issue, let's start with Marcus Giaquinto's pivotal work "*Visual Thinking in Mathematics*." Giaquinto first addresses the basic question already repeatedly invoked:

"*Plato, famously presented a visual way of discovering a simple fact of geometry: if a diagonal of one square is a side of another square, this other square has twice the area of the first. Generalizing from his discussion of this case, Plato gave a tentative account of how geometrical knowledge is possible. That account has been much disputed, but a satisfactory alternative is hard to come by. So the question raised by Plato – how is pure geometrical knowledge possible? – is still very much alive today.*"[906]

Or, to put it somewhat differently, he was trying to find

"*…answers to the Kantian question 'How is it possible to have basic geometrical knowledge?' which respect the role of sensory experience without collapsing geometry into an empirical science.*" (loc. cit., p. 40)

In line with Kant's Transcendental Aesthetic, Giaquinto centers his reflections on the idea that *visual thinking* seems to be essential for understanding diagrams, geometrical figures, and many fundamental facts in mathematics or physics because this understanding can never be achieved by conceptual thinking alone. With this, however, he comes up against the current dogmatic EAN mainstream where the visual is, at most, seen as a provider of *sense-experience* without any probative force notwithstanding the fact that, as noted earlier, even Wittgenstein had moved in this direction in the context of his reflections on "see[ing] (…) as such-and-such" in mathematics. Giaquinto's book is packed with excellent examples and arguments, but he opts for a very honorable, if laborious, path which, at the end of the day, risks to get stuck somewhere in the extended EAN "minefields" rather than rise above them. For in his exposition of the problem, he relies on the language and the definitional approach of analytic philosophy, for instance how to define a geometric concept of a square in *language-analytic* terms. Thus, he takes the issue of "*concept*" and "*concept acquisition*" as the starting point of his reflections, which is the customary procedure in the EAN tradition. In this context, Giaquinto relies on a rather broad understanding of the term "*concept,*" which makes sense, and refers to the definition proposed by Margolis and Laurence: "*word sense, explanatory theory, category representation, prototype*," and the like.[907] But

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906 Marcus Giaquinto, Visual Thinking in Mathematics, Oxford University Press, Ox-ford/New York 2007, p. 12.

907 E. Margolis & S. Laurence, Concepts: Core readings, Cambridge MIT Press 1999.

in trying to conceptually define visual thinking with the aim of making it somehow compatible with the EAN language of "belief," "concept," "concept acquisition," etc., he sets out for a "mission impossible," as it were. For expressing visual thinking in the jargon of Anglo-American analytic philosophy is like trying to describe sounds by visual means, or tastes by colors, with the result that even though Giaquinto is one-hundred percent right in the matter, and the examples he offers are absolutely to the point, one is still unsure whether this type of argumentation will really win the day.

Thus, in opposition to Quine and "holistic empiricism," Giaquinto invokes a counter position. But Giaquinto asks the question of what is mathematical intuition, how can it be defined, which calls to mind our previous attempt to clarify the issue by drawing on Descartes' reflections:

"*It is like sense perception, but differs from it in that the data of intuition are not sensations and are not caused by action of things on our sense organs. It does not follow, Gödel argued, that the data of intuition are subjective, as Kant had asserted. 'Rather they too, may represent an aspect of objective reality, but as opposed to the sensations, their presence in us may be due to another kind of relationship between us and reality." The problem for this view is that no one has any idea what this relationship is or what cognitive faculties are involved.*"[908]

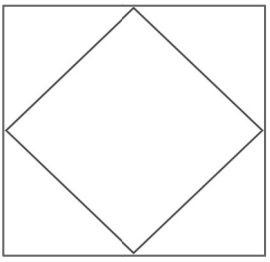
However, what is at issue here is precisely what Descartes, with respect to the solution of mathematical problems, described as the *intuitive evidence*, or intuitive insight, that makes one grasp the *simple natures*; which solution, in the case of geometry, is reached by *visual thinking*. Also, it should be noted that Kant does not conceive of insight as *subjective*. Rather, even though insight occurs in or through the subject, its objectivation for the world of appearances is achieved by the forms of the intuition, namely space and time, and the categories and schemata. It is objectivating.

Giaquinto then goes one step further and introduces a "*perceptual concept*" of the square. This "understanding" of a square includes the capacity of "seeing" a square where there is only an imperfect figure, which calls to mind the process we have reconstructed from Plato's considerations in his Seventh Letter. This leads up to an extremely complicated definitional description of the *concept* (*square*), which is a practicable but, as I see it, inadequate way of solving the fundamental problem of the "category leap." After all, no description, be it ever so detailed, can make me understand what it means to *all at once* "see" or, actually, *visually realize*, in the aha experience, the solution to a geometrical problem, a chess

[908] Marcus Giaquinto, Visual Thinking in Mathematics, Oxford University Press, Oxford/New York 2007, p. 60. Giaquinto's quotation is taken from Kurt Gödel, What is Cantor's Continuum Problem? In: Benacerraf & Putnam (eds.) Philosophy of Mathematics: Selected Readings, Cambridge University Press, 1964, revised and expanded from American Mathematical Monthly, 54 (1947), 515–25.

problem, or some other brain-teaser. This simply is a faculty we all know we have and permanently make use of, tacitly, for instance when stowing some luggage in the trunk of our car or doing some repair work, but which is nevertheless hard to define with any precision. Can I explain what it is that enables me to recognize, in a split second, the face of an acquaintance in a huge crowd? Can I define *precisely* and to the last detail what happened and, what is more, explain *how* I recognized him, let alone express all this in the conceptual formulas of analytic philosophy? It's most unlikely. At any rate, having introduced the *concept* of the square, Giaquinto proceeds to the "*perfect square*." Once internalized, this concept enables us "*to see the general in the particular. One cannot have those concepts without having a disposition to form a general belief as a result of a certain kind of visual experience*" (loc. cit., p. 39); which is, in principle, consistent with Plato's approach.

Assuming the faculty thus described and the previous acquisition of the *concept* of the *perfect square*, Giaquinto, under the heading of "*Geometrical Discovery by Visualizing*," now proceeds to a demonstration of the *experimentum crucis*: he takes a square with a smaller square that is inscribed into it with its corner points bisecting the sides of the larger square:



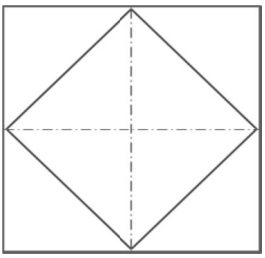
Respondents are, then, asked to specify the size of the area of the inscribed square in relation to the area of the large square. In mathematical terms, there is probably more than one way to solve the problem, but visual thinking makes us "see" the solution within seconds. But what is at stake here is not primarily the "turning and rotating" of triangles (à la Shepard & Metzler (1971)), nor the mental drawing of auxiliary lines by means of the imagination as described in some detail by Steven Pinker following the works, already referred to, of R. Shepard:

"*Many other experiments have corroborated the idea that visual thinking uses not language but a mental graphics system, with operations that rotate, scan, zoom, pan, displace, and fill in patterns of contours.*"[909]

There is more to it, for in this case, the operative capacities of the imagination that are used to solve this type of problem need to be comple-

[909] Steven Pinker, The Language Instinct, New York 2007, p. 63.

mented by a *logical* function. It does not suffice to draw, in thought, a cross of auxiliary lines connecting the corners of the inscribed square and fold over the corner triangles formed by the sides of the small square and the large square, you also need to understand and grasp that the size of the area thus formed is actually *half* the size of the area of the large square. This means that the necessary operations indeed happen in the way described by Steven Pinker but that, and this is crucial, they are *supplemented* by a *logical dimension*! For you need to understand, all at once, the meaning of *double*, *half*, *identity*, *quadruple*, *area*, *triangle*, etc., since the "rotating and turning" of the triangles alone does not lead to the solution of the geometrical problem.



Having suggested the visual approach, Marcus Giaquinto interprets the process as follows:

"*But this should not prevent you from seeing that a person could have acquired this belief by visualizing in the way suggested. The route to belief described above is mixed. Part was valid verbal reasoning; part was the act of visualizing which led to one of the premises of the verbal reasoning.*" (loc. cit., p. 52)

I would be even more radical here and assert that while the problem is indeed presented in linguistic terms, the rapid, visual solution happens within seconds (and "at once") and does not require a linguistic component at all since what we have here is visual thinking. It is not only an "*act of visualizing,*" it clearly is, at the same time, thinking that carries out functional comparisons between areas, identities, mappings, and translations. This is not only about "*seeing something as …*," it is about *thinking* that needs to accomplish fundamental logical operations and to logically consider, with reference to the initial situation, the transactions carried out with the four triangles and the size, obtained by the sum of these triangles, of the newly formed area. The problem with the concrete apprehension and description of this process is that the individual steps are so familiar and so automatized that we take them to be "seeing" or imagining although they clearly are true *thinking*. And I fully subscribe to what Giaquinto further notes in this context, namely that everyone who has gained the *intuitive insight*, by the visual method, that due to the transaction carried out with the triangles, the area of the inscribed square is half

the area of the large square has a *feeling of certainty* that this solution is correct or, inversely, that no one would even stop to think that this could be otherwise. Just as one knows that taking away one of two stones means that only one stone is left, one is certain about the correctness, necessity, and universal validity of the solution to the problem of the two squares. In terms of the clarity, distinctness, and certainty of the *intuitive evidence* that is there *all at once*, this is perfectly consistent with the descriptions found in Descartes as well as in the context of the *aha experience*. Giaquinto now further pursues the question of how this process of solving a geometrical problem by visualization is possible at all. He first brings into play Plato's well-known hypothesis that this is due a kind of *recollection*, in our soul, of forms once seen although he himself does not follow this explanation in its classical form. Rather, he offers a different one (with "B" being the solution, previously described, by *visual thinking*):

"*However, there are alternatives to Plato's hypothesis. Even if the subject's prior cognitive state did not include believing B already, it might have included resources sufficient to produce belief B upon visualizing. We can draw on the cognitive resources mentioned in the previous two chapters.*" (loc. cit., p. 60)

Thus, the main argument is that our grasping of the correct solution is due to the activation of *innate dispositional* mental resources in the sense suggested by Descartes (e.g. in the "Conversation with Burman"). Giaquinto also refers to the findings of Stephen Kosslyn in this context, already repeatedly quoted in our chapter on *vision science*.

Giaquinto then comes to the crucial point, thus anticipating our discussion in the chapter on Plato's "Meno" dialogue. He says that on seeing the initial figure, some respondents fail to imagine the cross-shaped auxiliary lines. As a result, they find it difficult to visualize the triangles and, as a logical consequence, cannot project and transform the triangles:

"*Some people are not caused to visualize this by visualizing the corner triangles fold over; but this is usually remedied by asking them to visualize the lines joining midpoints of the opposite sides. Either way, then, one comes to visualize the new figure.*"

This insight brings to light a number of important thoughts. Firstly, what is suggested here is the method of prompting insights by *questions* that was already applied in the "Meno" to step by step enable the slave boy to "see," or recollect, the correct solution. But secondly, and this is crucial, as soon as the *auxiliary lines* are imagined, insight by visual thinking comes rather easily and very quickly. The essential idea here is that in terms of problem-solving, drawing (in the "Meno") or imagining (in Giaquinto's *experimentum crucis*) auxiliary lines is more efficient, or helpful, than guidance by questions, i.e. language. One simply "sees" the solution by *intuitive evidence*. But, as previously noted, this is not just about visualizing the a priori existing "concept" of the square, for it is obviously not the

"*concept*" of the square that leads to the solution but the *auxiliary lines*, the *triangles* and their transformation, the grasping of identity, sameness, proportions, the half, the adding-up of areas, the checking against the initial situation! The solution is *logical*, *universally valid*, *necessary*, and *without any alternative* and, therefore, is nothing at all to do with seeing, sense data, experience, nor with logical operators or internal monologues. It is *visual thinking*, quite uncontrovertibly, that rapidly and without effort finds the solution by all at once imagining, rotating, turning, comparing, and thus grasping the correct solution. Moreover, in those respondents who did not draw but only imagined the auxiliary lines, this thinking led to the correct solution without any recourse to sensory perception in the proper sense because nothing visible was added! The *visual thought process* that leads to the insight is *a priori* and *synthetic*, *universal* and *necessary*, as Giaquinto quite rightly notes as the result of his experiment, and it does not lead to a random solution but to the *correct* one, quite independently of any sense impressions of the color, size, or design of the squares.[910]

Marcus Giaquinto then offers a number of other instructive examples from mathematics and geometry where visual thinking plays a decisive role in the cognitive process, before coming to the brilliant conclusion, already quoted:

"*The creative heart of the discovery process lies in viewing a form in two ways at once.*"

This key insight captures the very act of the creative process, already mentioned above, that Arthur Koestler called "*bisociation*," i.e. the discovery of a new approach to or solution of a problem by considering it from two entirely different perspectives at once.[911] At the same time, it is suggestive of Ernst Cassirer's important insight that the *respect* in which a certain series of elements is considered may determine which elements actually belong to this series, provided this *respect* is not derived from the elements of the series themselves but is due to a different level of thinking.[912] So, we are again faced, if in a somewhat different way, with the act of "*viewing a form in two ways at once*," a creative capacity that is obviously based on *visual thinking* but has, at the same time, found its way into abstract thinking, as well, whether in terms of the joke as described by Koestler, where the effect is due to the sudden change in perspective, or in

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910 Marcus Giaquinto, Visual Thinking in Mathematics, Oxford University Press, Oxford/New York 2007, p. 68.

911 Arthur Koestler, The Act of Creation, Picador Pan Books, London 1975, p. 34f.

912 Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, p. 25f.

terms of Cassirer's considerations regarding set theory, or function theory. It is a very concrete effect which Giaquinto describes as follows:

"*This was illustrated (…) by the visual route to the theorem that the square whose vertices are midpoints of the sides of another square has half he area of this other square: a particular line segment was viewed both a diagonal of one square and a side of another; a certain triangle was viewed both as half of one square and a quarter of another; (…) It is clear that this is a non-empirical mode of thinking in which the experience of visualizing plays an essential role, so again we have examples of synthetic a priori ways of reaching mathematical truths, but this time in the domain of number theory rather than geometry.*"[913]

The question of how to solve geometrical problems by "*visual thinking*" and to do so with a priori necessity is dealt with in the second book mentioned above, Jesse Norman's "*After Euclid – Visual Reasoning & the Epistemology of Diagrams*." In his paradigmatic demonstration, Norman uses Euclid's famous Proposition I. 32 – "*the sum of the three interior angles of the triangle equals two right angles*" that is, 180 degrees – as an example. Marcus Giaquinto had also dealt with the issue but Jesse Norman dedicates the major part of his book, which is explicitly located in the *neo-Kantian* tradition, to a very precise and careful discussion of the problem.

There are three points that Jesse Norman seeks to clarify and argue:

"*1. The kind of visual thinking we do in following an argument in Euclid can be epistemically valuable – and specifically, that it can justify belief and yield knowledge:*
*2. We can identify in the Critique of Pure Reason an embryonic account of such thinking that is preferable to its major alternatives; and*
*3. This account can be developed into a persuasive explanation of the epistemic value of this type of reasoning; one which is recognizably Kantian, but which does not appeal to any special faculty of intuition.*"

These three arguments are, then, explored in a careful step-by-step demonstration of the famous Proposition I. 32 from Euclid's *Elements*, with each step completed by a summary designed to clarify the specific contribution made by the visual element of the thought process to the logical course of the construction. Although this is a step-by-step logical process, the core message of the entire argumentation is that one "sees" the congruence or, in other words, the "flipping" of two of the triangle's angles. This understanding is so unequivocal and *sudden*, the *insight* so *clear* and *distinct* that as soon as the relation has been grasped, no relapse into the previous state of not knowing is possible. Norman explains this process based on the following generic diagram:

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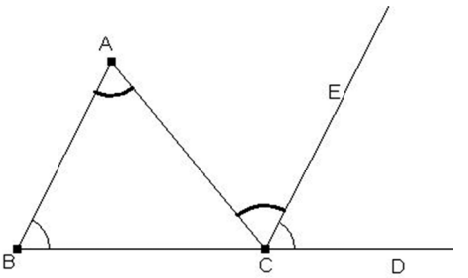
[913] Marcus Giaquinto, Visual Thinking in Mathematics, Oxford University Press, Oxford/New York 2007, p. 158.




"*Note that during this process nothing has changed about the diagram. What seems to warrant the inference, rather, is an act of 'seeing as' (…) Note that this last inference is not substitutional, is not general in nature but apparently limited to geometry, and seems to require the reasoner to reason with the diagram: it is by ‚flipping' between different ways of seeing the diagram that a reasoner is enabled to make the inference.*"[914]

Norman describes the process in terms of "*seeing as…*," which refers to Wittgenstein's "Remarks on the Foundation of Mathematics," already discussed in the Introduction, but is actually something entirely different. For what this is about is not the seeing of the schematically drawn rabbit as a duck, that is, a primarily image-based flipping of the gestalt perception, it is the grasping, based on the size and relation of two angles, of a visual-quantitative logical connection. It is not "seeing as…," it is an example of what Marcus Giaquinto has so aptly described as "… *viewing a form in two ways at once.*" It is grasping, by thinking, two angles in a novel *respect*, with no need for language-based conceptual thinking at all. Which means that it is *visual thinking*, not "*seeing as…*"! But Jesse Norman, going ahead with his examination of the process, also describes his own way of finding the geometrical proof:

"*Just to speak from personal experience: when I read (III,* the core argument, my note*) in context, I seem to focus on the diagram. I have difficulty even understanding (III) without looking at a diagram, or visualizing a figure, and – unless I am talking through the argument or self–consciously framing my thoughts in language at each stage – I am not sure I consciously think thoughts with linguistic contents at all in relation to the intervening claims here. (…) Indeed, I do not seem to use a conscious process of inference at all to reach line 7* (Norman here refers to line 7 of the step-by-step inference of the geometrical proof, my note). *Rather, I look at the diagram and derive the information in a way that is phenomenologically immediate, or almost so.*"[915]

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914 Jesse Norman, After Euclid, – Visual Reasoning & the Epistemology of Diagrams, CSLI Publications, Stanford 2006, p. 38f.

915 Jesse Norman, After Euclid, – Visual Reasoning & the Epistemology of Diagrams, CSLI Publications, Stanford 2006, p. 40.

Jesse Norman's description of his thoughts during the problem-solving process – "*I am not sure I consciously think thoughts with linguistic contents at all in relation to the intervening claims here*" – actually reveals that what he observes in himself is pure visual thinking without "*linguistic contents*," not unlike the state of pure *visual thinking* experienced by a chess player who is "looking into" a complicated variation on the chessboard. In Norman's description, this visually gained insight is, then, "*immediate, or almost so*."

In addition to the *sudden* insight into the visual-logical connection, however, Norman's self-observation brings to light three further aspects. The insight is accompanied by, firstly, a feeling of what he calls "*accessibility,*" i.e. a transparency of the individual steps in reasoning that leaves no room for doubt, as Descartes would have said; secondly, a feeling of "*certainty*," i.e. the belief that the individual steps are clearly correct; and, thirdly, a feeling of "*clarity,*" clearness. Basically, the terms of "accessibility," "certainty," and "clarity" more or less correspond to the concepts of *clearness* and *distinctness* defined by Descartes as the criteria of true and correct insight, which in turn correlates with the scientific description of the aha effect!

Having demonstrated the essential and extremely efficient function of *visual thinking* in geometry, Norman turns to a sweeping criticism of the flawed empiricist conceptions that cast doubt on the status of geometry as an a priori synthetic science. In the chapter "*Crude Empiricism,*" he strongly criticizes Sir David Ross' account of Plato's *Meno* dialogue, which we will be discussed in our next chapter. Next, he takes on James Stuart Mills, this time under the heading of "*Mild Empiricism*," although it is indeed debatable whether "mild" is an adequate rating of J.S. Mills' doctrine (just think of Frege's criticism of the "cookies") and whether it doesn't actually qualify as a very extreme form of empiricism. He then deals with Leibniz and his ambiguous position. After Descartes and Spinoza, for whom geometry was *the* science par excellence and the paradigm per se of their presentation format, Leibniz denies that it has any value whatsoever, famously aiming at a complete mathematization of the sciences, with all relations being expressed by logical linguistic systems. Norman comments: "*As noted, Bertrand Russell seems to have held these (or very similar) views, at least in 1900–1902.*"[916] Finally, Norman dedicates the second half of his work to an outline of Kant's theory of geometry. His focus, here, is on the issue of *intuition* and *schematism*, on the one hand, which then serves as the basis for him to set forth a neo-Kantian theory of geometry, on the other. He steers clear of the well-known EAN criticism of Kant and even criticizes Friedmann's interpretation, already discussed, which, while it does show a certain "appreciation" of Kant,

[916] Jesse Norman, After Euclid, – Visual Reasoning & the Epistemology of Diagrams, CSLI Publications, Stanford 2006, p. 75.

actually takes the sting out of it. Finally, Norman comes to the conclusion:

"*What emerges is, a theory of a* certain kind of visual thinking *or reasoning. (…) the Kantian view not only avoids the difficulties facing its competitor views, but also advances a promising though partial explanation of this* visual thinking. *However, it does so within a set of assumptions that many philosophers have found it hard to accept, and in the face of important further objections in principle.*"[917] (my emphasis)

So, in terms of method, this is what Jesse Norman found: Kant's theory of geometry is essentially linked to the function of intuition, while the concept, due to the extreme polar positioning of *concept* and *intuition*, is unable to realize even the simplest line that can be drawn in the pure intuition, let alone carry out the spatial, three-dimensional construction of geometrical figures. From a logicistic point of view, there may well be many geometries, for instance for n-dimensional spaces, but Kant's doctrine is essentially a philosophy of experience.[918] As a consequence, answering his initial question of how synthetic a priori judgments are possible entails the need for him to establish a comprehensive logical network that ties together intuition, object, appearance, imagination, axioms of intuition including extensive magnitudes (B 202) and anticipations of perception (B 207). This is Kant's way of making sure that the real objects of the external world are indeed governed, if only as phenomena, by our understanding but nevertheless remain measurable and constructible, thus guaranteeing the link of geometry and mathematics to the world of objects. This has most stringently and clearly been set forth by Gordon Brittan in "*Kant's Theory of Science*," which will be discussed in detail with regard to intuition and synthesis in the chapter on Kant.[919]

But for Kant's theory of geometry to be really applicable, a further element is still needed – the function of *schematism*. For Norman quite rightly points out that in purely functional terms, schematism is neither a concept nor an intuition and is actually introduced into Kant's *Critique of Pure Reason* at the very point where what is at issue is the *visual thinking* of geometrical contexts and problems! So, this is precisely the point where visual thinking would need to be integrated into Kant's doctrine, for "[*t*]*he schema is in itself always only a product of the imagination; … a*

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[917] Jesse Norman, After Euclid, – Visual Reasoning & the Epistemology of Diagrams, CSLI Publications, Stanford 2006, pp. 104 and 113.

[918] See, e.g.: Hermann Cohen, Kants Theorie der Erfahrung, Berlin 1885 (reprint); Helmut Holzhey, Kants Erfahrungsbegriff, Basel 1970; Peter Baumann, Kants Philosophie der Erkenntnis, Würzburg 1997.

[919] Gordon Brittan, Kant's Theory of Science, Princeton University Press, New Jersey 1978.

*general procedure … for providing the concept with its image*."[920] But imagination is not thinking, and "*providing the concept with its image*" is not the same as grasping Euclid's Proposition I. 32 by visually transforming the angles. Norman finally summarizes what he has found to be the core process of the application of Kant's doctrine of geometry in the context of understanding Euclid I. 32:

"*As I interpret it, Kant's point is this: when a reasoner draws or visualizes a diagram of a triangle, she is not merely using concepts acquired as a result of grasping Euclid's definition. Rather, she is relying upon a (for Kant, non-conceptual) sensation-independent capacity to represent something as occupying (actual or visualized) space. Though diagrams of triangles can be perceived in empirical intuition, Kant takes it that a reasoner can have an image of a triangle via the exercise of her visual imagination that is free of sensory input, and this would be pure, or a priori.*"[921]

What is decisive here is the formulation: "*relying upon a … sensation-independent capacity*," that is, trusting in a capacity which is neither conceptual nor dependent on sensory impressions but a "*visual imagination that is free of sensory input, and this would be pure, or a priori*." In other words: *visual thinking – non-conceptual*, *not driven by sensory perception*, and both *pure* and *a priori* – the perfect starting point for a fresh reading of Plato's *Meno*!

**Conclusion:**

1. Problem solving in the deaf and thinking in chess were taken as examples to empirically explore domains where logical solutions can be found by visual thinking without recourse to language. But the achievements described go far beyond anything that could be categorized as seeing or imagining. It clearly is problem-solving, reasoning without language.
2. Kant, just as Descartes before him, accords a central role to geometry in synthetic a priori thinking, thus confirming the basic tenet of *rationalism* that *new* knowledge can only be gained by the gestalts formed by the understanding, by the application of mental schemes. In both cases, *intuitive evidence*, or the spatial construction in *pure intuition*, that is, the *logical-demonstrative* character of geometrical reasoning plays an essential role in the grasping of the *simple natures*.
3. The *form* of our intuition of space is subjectively preformatted, if in an *objectivating mode*, because this is the nature of our intuition and

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[920] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 273 (B 180).

[921] Jesse Norman, After Euclid, – Visual Reasoning & the Epistemology of Diagrams, CSLI Publications, Stanford 2006, p. 99.

our way of thinking "*from the human standpoint*." Kant thus assumes that for us, space is not perceived as a huge void in the Newtonian sense but as constituted by a form of "pure intuition" (B 40) and, contrary to the empiricist belief, cannot be abstracted from external things, or the world, but is a given *form* of our intuition that always already exists before any representations.

4. Kant assumes that for humans, this form of the intuition cannot be other than three-dimensional (B 40) and that Euclidean geometry is the form that intuitively correlates with this intuition of space, thus enabling us to gain practical experience on earth (B 16; B 299). According to Kant, this opens the possibility, in our human space, of synthetic a priori *pure constructions* in geometry.[922]
5. Kant holds that the constructions of Euclidean geometry are "undeniably[923] true for the empirical reality of appearances, and explains the measurability of the world of real objects by the *axioms of intuition* and the *anticipations of perception*, thus also grounding the validity of their practical usage.
6. The relation between Kant's "organization of space" and non-Euclidean space – that is, curved outer space which, as a consequence of the theory of relativity and spacetime, has become the paradigm in physics and astronomy – is a complex one. In accord with Poincaré and Cassirer, I assume that the description of actual space "*in itself*," just as in quantum physics, will always draw on specific geometrical *models* and that, on earth, we can choose the "most convenient" one. Since outer space, or spacetime, could have *different forms* and *different degrees of curvature* at different points, determining the best, or most adequate, form of non-Euclidean geometry is a complex challenge. There are strong indications that Euclidean forms are innate at least as forms of our perception but most likely also as forms of our thinking, which suggests that for millions of years, they have stood the "pressure test" of evolution.
7. Poincaré's "dictionary" has shown that Euclidean geometry can be translated into non-Euclidean geometry, which suggests that synthetic a priori cognition goes beyond and transcends classical analytic efforts, a view that Kant would certainly subscribe to.
8. *Intuition* in geometry, criticized as futile and disruptive by Russell and his successors and a bête noir of logicism, is a major conflict issue. Criticism is also raised against the use of concrete representations and constructions of figures, problems, and solutions by drawings – i.e. with pencil, ruler, and compass –, which is considered a

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922 See Ottfried Höffe, Kants Kritik der reinen Vernunft, München 2011, p. 97ff.

923 Ottfried Höffe discusses this in detail in the chapter "Eine transzendentale Geometrie" in: Kants Kritik der reinen Vernunft, München 2011, p. 97–106.

completely superfluous auxiliary technique (or, at worst, a source of misconceptions), "outdated" and inferior to any purely logical or algebraic representation. Russell's stand here is that geometry should be completely algebraized and defined in logicistic terms and that the visual approach only opens the doors to erroneous conclusions. It could be shown that pure cognition in geometry is not the "slave" of the drawn representation and that logical-synthetic reasoning can make its results visible by figures and constructions whereas not every algebraic transformation can be figuratively represented. *Intuition* alone as the operating mode of geometry in Kant is too "poor" and will therefore, in a subsequent chapter, be subjected to a reexamination from a perspective of *visual thinking*.

9. The issue of the *origin* and *validity* of the *axioms* and *postulates* becomes virulent in Russell's criticism. Axioms are laid down as evident truths that, in accord with certain *conventions*, serve as the premises of a formal theory. Nevertheless, the validity of these man-made conventions and axioms remains disputable. Brittan quite rightly points to Kant's momentous argument that the results of geometry should always remain "*really possible*." Poincaré very clearly formulated the basic problem of logicism, namely that "*what [mathematics] has gained in exactness it has lost in objectivity*" [924] – its realistic "grip on reality."
10. Novel approaches such as those of *Marcus Giaquinto* and *Jesse Norman* suggest that *visual thinking* plays an essential role in the solution of geometrical problems, a role that cannot be reduced to either sensory impressions – Wittgenstein's "*seeing as …*" – or the properties of the respective drawings and diagrams. Rather, it is a manifestation of pure logical-synthetic reasoning that goes beyond "intuition" or the mere carrying-out of operations in the imagination (the "rotating and turning" of mental objects) and clearly is a *form of thinking*, if a basic one.

So, the gist of this chapter would seem to be Marcus Giaquinto's brilliant insight: "*The creative heart of the discovery process lies in viewing a form in two ways at once*." That is to say that this new *insight*, gained in synthetic a priori terms, consists in our seeing a gestalt or a connection in two respects at once, one we already have and another, additional one that constitutes the synthetic a priori step. This sudden insight, by the *natural light*, into a *simple nature* – this creative "seeing" of a novel connection where others, seeing the same thing, fail to realize the *new aspect* – defines the moment where novel knowledge is formed and existing knowledge is extended. The "primal scene" of this gaining of novel insight can be found in Plato's famous *Meno* dialogue; which warrants a fresh reading in a new *respect*, to be undertaken in the next chapter.

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[924] Henri Poincaré, Science and Method, London: T. Nelson 1914, p. 124.

# Book Two

## III. Plato's "Meno" – the discovery of innate visual thinking in the course of (geometric) problem solving

Plato is not only considered to be the true founder of occidental philosophy as such, his thinking and his foundation of philosophy are also, and most particularly, at the core of the self-understanding and spirit of Neo-Kantianism. Richard Kroner, for instance, sees Kant's philosophy as a "*revival of Platonic idealism in a German spirit*" and, inversely, also refers to the intensive study of Plato's doctrine as a means of coming, via Kant, to a new reading of Plato, and vice versa, a line of thought especially evident in the exponents of the Marburg school of *Neo-Kantianism*. Cases in point are Cohen's "Platons Ideenlehre and die Mathematik" (1878), Natorp's "Platos Ideenlehre" (1903), Nicolai Hartmann's "Plato's Logik des Seins" (1909), und Siegfried Marck's "Die Platonische Ideenlehre in ihren Motiven" (1912).[925] Mention should also be made of Ernst Cassirer's presentation of Plato in "*Die Philosophie der Griechen von den Anfängen bis Plato*" in the first volume of Max Dessoir's 1925 "Lehrbuch der Philosophie" ("Textbook of Philosophy"). Although Cassirer never wrote a monograph on Plato, the latter is a more or less obvious point of reference in virtually all his writings, including his essay "*Idee und Gestalt*":

"*One of the earliest translations of Plato's 'form', or 'idea,' in German philosophical language was 'gestalt.'*"[926]

This is an important observation especially for our present study since the "gestalt" of the visual domain could indeed be considered an adequate precursor of the idea!

At the same time, Plato's thinking also marks the beginnings of *modern rationalism*, and *Descartes's* thinking, as we have already pointed out, clearly draws on Plato's doctrine of innate ideas, his intensive study of

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925 Richard Kroner, Von Kant bis Hegel, Tübingen 1977 (1921), Vol. I, p. 35. On the issue of interpreting Plato from a neo-Kantian perspective, see: Karl-Heinz Lembeck, Platon in Marburg, (Königshausen & Neumann) Würzburg 1994, p. 237–250.

926 Ernst Cassirer, Idee und Gestalt, Darmstadt 1971 (1924), p. 17.

*geometry* and even, if somewhat modified, his theory of *forms*, or *ideas*. In this sense, studying Plato is essential especially for *Neo-Kantianism* and its critical rethinking of the *rationalistic core* of his doctrine – and, by implication, Kant's philosophy (!). This is also why it is of interest to see whether *visual thinking* can already be ascertained at the very source of occidental philosophy, that is, in Plato. The "*Meno*" dialogue belongs to Plato's so-called middle period and was most likely written about 386/385 B.C.:[927]

"*The Meno dialogue which, in the relative chronology of his works, is usually placed after the Gorgias and before the Phaedo and the Symposium, is seen as a 'dialogue of transition' from the Socratic to the genuinely Platonic phase in Plato's work.*"[928]

According to Paul Natorp, the philosophical-strategical relevance of the dialogue and, most of all, the *thought experiment* it contains for the development of Plato's philosophy as well as all subsequent philosophy resides in the fact that the proof, by demonstration, that new geometric insight, new knowledge, can be gained by drawing on nothing but a respondent's "natural" thinking can be said to mark the *birth* of the a priori in philosophy (even though this is in part denied by empiricism):

"*Self-knowledge is now no longer distinct from the knowledge of the object, for there is no true object any more that is not constituted, in accord with the proper law of cognizing, in the concept of cognition. Cognition, pure cognition, is the self-generated concept in which alone the object becomes certain for us. There is no object unless created by the specific law of the consciousness, namely as the object of this consciousness*."[929]

This important insight is also shared by Julius Moravcsik, an American expert in ancient Greek philosophy, who compares Plato's theory of knowledge acquisition with Kant's transcendental argument:

"*Thus recollection takes place on two levels; the slave boy is recollecting geometry, and Meno is recollecting what learning is. The parallel shows that Plato's theory of learning is meant to be an a priori thesis… With regard to these conditions Plato's argument seems to take the following form: given that there is successful inquiry into a priori matters, and given the nature of such inquiry (…) together with certain general facts about human learning conditions, learning within this restricted scope must be recollection. This structure is very similar to the structure of Kant's transcendental arguments. In those arguments too, certain propositions are shown to be necessary on*

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927 Richard S. Bluck, Plato's Meno, Cambridge University Press Cambridge 2010 (1961), p. 118.

928 Oliver Hallich, Platons 'Menon', Darmstadt 2013, p. 11.

929 Paul Natorp, Platos Ideenlehre, Eine Einführung in den Idealismus, Hamburg 2004 (1903), p. 31.

*the basis of the analysis of all pervasive human abilities and their typical manifestations*".[930]

Due to the key position of the *Meno* dialogue as the very moment where the idea of the "*a priori*," clearly and distinctly argued, took root in the consciousness of philosophy and the history of mankind, its importance can hardly be exaggerated and has time and again been confirmed by eminent thinkers from all epochs. Natorp cites Proclus, Keppler, Galileo, Leibniz, and Kant, while in more recent times there is not only Chomsky but thinkers as diverse as Michael Polanyi,[931] Karl Popper,[932] Alexandre Koyré,[933] and many more who describe it as an important point of reference. As for Descartes, we have already seen that Plato's method of presenting as well as solving a geometric problem most likely provided the motivation for him to write the *Regulae*. In his famous polemic against Voetius, Descartes explicitly refers to the *Meno*:

"*Hence, according to Plato, Socrates asks a slave boy about the elements of geometry and thereby makes the boy able to dig out certain truths from his own mind which he had not previously recognized were there, thus attempting to establish the doctrine of reminiscence.*"

The phrase "*dig out certain truths from his own mind*" certainly captures how Descartes' understood the way our own thinking works, and for Noam Chomsky the problem discussed by Plato in his *Meno* and *Phaedo* dialogues, namely how knowledge can be gained at all – "*Plato's problem*" –, became the argumentative starting point of his entire linguistic theory.[934] In these dialogues Plato, for the first time ever, raised and sought to answer this fundamental question, or fundamental problem. Also, there is a systemic link between the core issues of the *Meno* and a number of other important elements of Plato's thinking, such as, for instance, the *theory of forms* or *ideas*, the importance of *geometry* that plays so prominent a role in the *Meno*, the *seeing* of *forms* with *the eyes of the mind*, as well as the exposition of the *hypothesis* in the *Phaedo*. What should be kept in mind here is that the doctrine of *recollection* – which assumes that the sought-

930 Julius Moravcsik, Learning as recollection, in: Plato. A collection of critical essays, ed. Gregory Vlastos, Anchor Books, New York 1970, p. 63.

931 Michael Polanyi, The Tacit Dimension, University of Chicago, Chicago/London 2009 (1966).

932 Karl Popper, The Open Society and Its Enemies [1945], Princeton University Press 2013.

933 Alexandre Koyré, Discovering Plato. New York: Columbia University Press (London: Oxford University Press), 1945.

934 René Descartes, Letter to Voetius, May 1643, in René Descartes, The Philosophical Writings of Descartes, Vol. III, Translated by John Cottingham, Cambridge University Press 1991, p. 222; Noam Chomsky, Cartesian Linguistics, Cambridge University Press, Cambridge/New York (1963) 2009.

for knowledge had always already existed in the soul (the consciousness) of the slave boy and had only to be "recovered" by appropriate questions – also provided the grounding for *nativism,* that is, the insight that knowledge must not only exist, in some way, even before we reflect on it but that its basic elements must be *dispositionally innate*. From a point of view of philosophical history, this insight, brought to light by Plato on the basis of his experimental setting in both the *Meno* and the *Phaedo*, has occasionally been treated as secondary, negligible or, at worst, a lapse into myth. However, from a perspective of modern *rationalistic Neo-Kantianism*, and notwithstanding the fact that Plato's explanation is still mythical and, thus, insufficient by today's standards, Plato was actually right, as we have repeatedly sought to make clear in the course of this study.

In his *thought experiment*, Plato demonstrates that new knowledge, at least with respect to a geometric problem, can only be gained by *visual thinking*, or *visual insight*. At least in this case, the *a priori* insight cannot be gained without *visual thinking*, while at the same time, *visual thinking* is an element of the a priori. Still, this visual process is nothing to do with *sensory perception*, except that the drawing in the sand must, of course, be seen if there is to be any reasoning about it at all. And now the time has come for us to bring to fruition all the elements we have set forth and positioned in the first part of this book: *intuitive evidence*, *simple natures*, *insight*, the *aha effect*, the problem of searching for new knowledge in terms of a *hypothesis*, the *a priori* character of the grasping, with *necessity* and *universality*, of correct (!) new knowledge, the position of *geometry* as the work of pure imaginative construction that goes far beyond "sense experience" of whatever kind, *depictive imagination* (Kosslyn), the *understanding of function*, and *visual thinking*. Based on Plato's *Meno* dialogue, I propose to show that a priori cognition not only plays an epistemically essential role but that *visual thinking* and a priori cognition are absolutely and genuinely woven together because our *conceptual* thinking has evolutionarily developed from *visual* thinking; and, what is more, that *visual thinking* is on an *equal* footing with conceptual thinking and constitutes the very element, the organic link, that has always already fundamentally ensured and mediated the connection between *intuition* and *concept*. At the same time, I propose to bring to light a certain indecision in the philosophical discussion about the *Meno*, in particular, regarding the weighting of the share of *sense experience* and *conceptual-propositional knowledge*, respectively, in the problem-solving process. This is the very point where this blank area on the map of knowledge can be filled in, for it is neither by sensory perception – the "seeing" of the square – alone nor by Socrates' conceptual questions alone that the slave boy solves the geometric problem. Ultimately, the solution of the geometric problem is in actual

fact due to *insight* by *visual thinking*, a fact vaguely felt but not explicitly taken into account by most commentators!

One of the few commentators to have realized the particular relevance of visual thinking in the *Meno* is *Marcus Giaquinto* who primarily discusses the role of diagrams for thinking in geometry but also literally speaks of "*visual thinking*":

"*In this paper I argue that the exchange between Socrates and the slave in Plato's Meno, approached in the right way, reveals another role of diagrams: in this role they enable us to think visually about mathematical subject matter in a way which can be assimilated neither to gathering visual evidence nor to picturing a situation independently described in a proof. Though this kind of visual thinking is valuable, its nature and epistemology are not well understood*."[935]

This statement, and in particular the last sentence – "*Though this kind of visual thinking is valuable, its nature and epistemology are not well understood*" – is remarkable since it is precisely this *nature and epistemology* of *visual thinking* and its potential for gaining new insight that needs to be clarified! One of the few authors, besides Giaquinto, to have realized and thematized the eminent importance of *visual thinking* in Plato and its intrinsic link with geometry, on the one hand, and the theory of forms, or ideas, on the other, is Julius Stenzel. Stenzel not only links *visual thinking* based on geometric figures to intuition in the Kantian sense, he also insists that seeing the geometric gestalts, figures and, most importantly, connections is the precondition for knowledge to be, first, recovered "from within oneself" and, then, applied:

"*The second effect that dealing with mathematics had on Plato's thinking is even more obvious with regard to the development of the theory of ideas. The slave boy's catechesis rests on the possibility of using a figure to make mathematical conclusions immediately obvious. … without the figure, the slave boy's anamnesis would have been impossible.*"[936]

This means that while intuition is essential for the success of Plato's *thought experiment*, it is not simply reduced to *sensory perception* but seen as an integral part of the process of recollection, or learning. At the same time, Stenzel emphasizes the intricate connection between this visual-cognitive element and geometry, which suggests that while he is actually quite close to the insight that what accounts for this "*intricate connection between intuition and thinking*" is *visual thinking*, he nevertheless fails to realize it:

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935 Marcus Giaquinto, Diagrams: Socrates and Meno's slave, International Journal of Philosophical Studies, Vol. 1:1 (1993), p. 81.

936 Julius Stenzel, Platon der Erzieher, Hamburg (Meiner) 1961 (1928), p. 164f.

"*This intricate connection between intuition and thinking gained immense significance especially for Plato when he had, from the start, understood that the purely logical aspect of the mathematical syllogism was a prime example of the dialectical procedure, and had become aware of the problems of 'mere' intuition; … The more Plato came to think of mathematical reasoning, too, as a series of logical and, if you will, fundamentally abstract steps in reasoning, the more one wonders at the fact this very insight enabled him to apprehend in its full significance: that the abstract facts could be read off, as it were, from a figure, from an 'image' that was visible – if not palpable, as in the case of highly sophisticated stereometric models turned on a lathe -, i.e. that something so highly abstract and belonging to the sphere of pure thought was embodied in something visible*." (loc. cit., p. 165)

This "*embodiment*" *of the rational in the visible*, however, is the very point the *visual turn* seeks to foreground and bring to mind, namely that *visual thinking* means that what is called intuition is already *woven together* with thinking and that, therefore, intuiting cannot be separated, as mere intuition, from thinking. This fact simply needs to be taken into account, for otherwise the result, not infrequent at all, is a systemic separation between *intuition* and *concept*, or "*eyesight*" and "*concept.*" Stenzel concludes his argument by reminding us of Plato's affinity to Pythagorean thinking:

"*And in this mathematical theorem that is represented, in the figure, as an entity, a unity, the connection between sensory perception and thinking is even more intricate; while it is easier for us to separate musical notes, in thinking, from the thought logos of the intervals, intuition is much more insistent in forcing its way into general mathematical reasoning, at least in the field of geometry and, in particular, stereometry; it is much harder for us to ignore it, much harder to isolate the logos, embodied as it is in the concrete form, in its pure state, in itself, its logical self. … for it is only the reasoning insight, the nous, that knows what is right, what is universally valid, and invests seeing with that peculiar truth content that makes us grasp, in the seen reproduction, a prefiguration of the higher insight. A prefiguration? So, there it is again, the concreteness we just backed away from? This is the question we need to ask ourselves today, and which leads us right into the heart of the problems of the theory of forms, or ideas*." (loc. cit.)

These considerations already address and envisage everything that gives substance and momentum to the *visual turn*. Deep down and inextricably, intuition and concept, seeing and thinking are always already mutually "*embodied*," "*grown together*" (I deliberately use the biologistic metaphor here), so it is simply impossible to separate, or polarize, them as the two "*extreme ends*" of the cognitive process. *Visual thinking* is a faculty in its own right, a point that will below be further examined in Kant, as well.

But before engaging in a more detailed discussion of the text itself and, in the process, coming to an understanding of the function of *visual thinking* in cognition, I'd better take on a number of possible objections to the *Meno* dialogue so as not to be distracted by them in the further elaboration of the main arguments of this study. A first, and obvious,

objection is that this is a fictional dialogue. Of course, it is quite possible that an episode like this really happened and was later retold in a somewhat freer form. But let's say the dialogue is partly, or even entirely, fictional, in which case the objection would be that it is indeed a fine specimen of ancient narrative art but, from the point of view of science, has no probative force at all and does not even qualify as a valid argument. While this is, of course, a possible objection, it does not get to the heart of Plato's strategy. For if we take, for example, Descartes's *Meditations*, it is also far from clear whether Descartes really locked himself in his room on a winter's night to sit by the fire and explore the depths of radical self-doubt, or whether this was just the literary set-up that allowed him to stage the argument of radical doubt, if not his entire doctrine. Likewise, regarding the *thought experiment* of the *Meno*, it doesn't really matter whether the episode in Meno's house really happened that way, or just parts of it, or whether it is a pure *thought experiment*, like those engaged in by Galileo or Einstein, for instance, that helped them to develop their physical theories. Dominic Scott refers to this objection in his commentary "Plato's Meno":

"*…this passage is just a fiction and should not be treated as if it were an experiment being written up in a scientific paper. So what can a fictional experiment ever show?*" His answer is: … "*We are familiar with this from our own learning of geometry when we were at the same stage as the slave boy. Also, Plato's own readers may well have been engaged in discovering new geometric proofs that no one had ever taught them… In other words, the experiment, though only fictional, certainly chimes in with our own cognitive experience. It reminds us of something that we already know.*"[937]

Thus, the fact that the thought experiment "*chimes in with our own cognitive experience*" ("experience"!) makes it acceptable even for EAN exponents. As a matter of fact, this is an "experience" that is made, day by day and millions of times, at every school and every university where students are set to solve a problem: there is a teacher who knows the solution and provides assistance in the problem-solving process, but the *insight* into the correct solution must ultimately come from the students themselves. I think it very likely that at Plato's Academy, geometric problem-solving by an illiterate person was repeatedly tested and played through in practice and that the *Meno* dialogue is just the "clean copy" of such an experiment. At any rate, the core of the geometric solution is atemporal, as are, in principle, the questions and answers that lead up to it. Whatever the share of historical truth, it does in no way affect either "*Plato's problem*," as Chomsky described the initial situation – or, in Julius Stenzel's words, "*the paradox of learning, the clash of the unfathomable with the self-*

[937] Dominic Scott, Plato's Meno, Cambridge University Press, Cambridge 2009, p. 103.

*evident*"[938] – or the demonstrated solution. So, that's one issue to be shelved.

Another frequently raised objection is that at decisive points of the dialogue, the solution is not due to a genuine insight recovered "from within himself" by the slave boy but that the answers are suggested to him by Socrates' leading questions and are simply reproduced, parrot-fashion. The trivial answer to this would be that even if this were so, the person asking the questions must once have solved the problem himself, or heard about it from someone, and so on, so that at some point one would invariably come across the first person upon whom "*a new light had broken*," as Kant, referring to Thales' circle, writes in the *Critique of Pure Reason*:

"*A new light broke upon the first person who demonstrated the isosceles triangle (whether he was called 'Thales' or had some other name). for he found what he had to do was not to trace what he saw in this figure, or even trace its mere concept, and read off, as it were, from the properties of the figure; but rather that he had to produce the latter from what he himself thought into the object and presented (through construction) according to a priori concepts, and that in order to know something securely a priori he had to ascribe to the thing nothing except what followed necessarily from what he himself had put into it in accordance with its concept.*" (CPR, B XI/XII)

Of course, this raises the question of how much of what this person had "*thought into this object*" was conceptual and how much was due to *visual thinking*, but more on this later. At any rate, if we follow the unfolding of the argumentation in the *Meno*, it is quite clear that the insight gained by the slave boy is the result of his own reasoning rather than parroting. Marcus Giaquinto describes a frequent experience when discussing this point with his students:

"*…it is often argued that because Socrates asks leading questions the interchange goes no way towards showing that we can come to recognize a geometric truth for ourselves, let alone that such items of knowledge are already in us, in the memory-store awaiting recollection. Noting the leading questions, one might think: 'If I were in Meno's position, witnessing the interchange, I would not be convinced that the slave had seen the truth for himself; he could have been reacting sensitively to hidden linguistic cues in Socrates' questioning.' However, there is an alternative approach to the text which undercuts this reaction. For by following the text supplemented by diagrams, one can discover for oneself the geometric theorem as it might have been discovered by the slave if he had complied with Socrates' request to give as answers only what he genuinely believed (83 d2) rather than what he guessed Socrates believed; or, if one already knows the theorem, one can see how it could be discovered that way by someone not already in the know.*"[939]

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[938] Julius Stenzel, Platon der Erzieher, Hamburg (Meiner) 1961 (1928), p. 148.

[939] Marcus Giaquinto, Diagrams: Socrates and Meno's slave, International Journal of Philosophical Studies, Vol 1:1 (1993), p. 82.

This is, of course, another way for the reader to test the validity of the dialogue, namely by seeing whether he or she would indeed be able to find the solution on the basis of the initial question and the diagram, with or without a parallel reading of the dialogue. Furthermore, this test would also allow them, and this is Giaquinto's main argument, to verify whether visual thinking and the diagram alone would enable them to find the solution if they just let themselves be guided by Socrates' questions as presented in the text. From my point of view, this argument is very conclusive since Plato's actual purpose here is to demonstrate that this kind of *insight* enables every individual, irrespective of their education and social position, to comprehend and, drawing on their innate understanding, solve logical issues, problems, and connections, provided the latter do not exceed the "scope" of *simple natures* – so, why not the reader, as well? Furthermore, we need to take a very close look at what Socrates' questions may actually suggest in terms of solution-relevant knowledge, and what just serves to prompt the right kind of thinking in the slave boy's mind and, thus, enable him to find the solution by means of his own "recollection," that is, step by logical a priori step. In his concise commentary, Oliver Hallich offers a very lucid argumentation:

"*What Socrates 'puts into the slave boy's mouth' is the truth of individual propositions, such as, for instance, 'two times four is eight'… But what Socrates does not, and cannot, put into the slave boy's mouth, and what is not already implied by the interrogative form, are the connections between the individual propositions or, to be exact: the insight into the way they are connected. This knowledge about connections is nothing that can be suggested and 'prompted' by questions such as: this and that is surely true, isn't it? It is necessarily linked to its being understood.*"[940]

This is an important observation, for the slave boy's answers are quite realistic as well as consistent with Socrates' questions and, in terms of the logic of the text, not at all fetched out of thin air but quite in line with the *logical order* of the argument. In conclusion, however, Hallich comes to the decisive point:

"*The slave boy's answers, inconspicuous as they may be, are not mere reproductions of opinions that are more or less strongly suggested to him. Rather, they testify to an aha effect, a 'click of understanding,' for instance when he emphatically admits his ignorance (84a).*" (loc. cit.)

If Oliver Hallich's argumentation perfectly resonates with my own purpose, this is because the long and arduous itinerary through the first part of the present book, i.e. the detailed discussion of the nature of *insight* and the *aha effect*, will finally bear fruit. In the context of Plato's dialogue, both modes of acquiring new knowledge now become comprehensible in

[940] Oliver Hallich, Platons 'Menon', Darmstadt 2013, p. 105f.

their primal form, and their function fits seamlessly into the overall framework of the rationalistic theory of cognition. Which also means that, in my opinion, the objection that Socrates had put the answers to and solutions of the problem into the slave boy's mouth has been conclusively refuted.

The third objection, however, which is also the most serious one with regard to our study, is the one raised by Sir David Ross in "*Plato's Theory of Ideas*."[941] From a genuinely empiricist perspective, he addresses the role of sensory perception, i.e. "*sense experience*," in geometric problem-solving; an issue already frequently discussed in the course of this study. His objection prompted a well-known reply by Gregory Vlastos who very stringently demonstrates that Plato was primarily concerned with explaining the a priori form of insight and that the slave boy's self-gained insight was nothing at all to do with *sense experience*, even though he had, of course, to look at the figures that Socrates had traced in the sand to facilitate explaining things and make an illiterate boy understand the problem at all. Vlastos quotes the following pertinent objection by Ross:

"*. . . the method by which the slave-boy is got to discover what square has twice the area of that of a given square is a purely empirical one, it is on the evidence of his eyesight and not of any clearly apprehended relation between universals that he admits that the square on the diagonal of a given square is twice the size of the given square. He admits that certain triangles have areas equal, each of them, to half of the given square, and that the figure which they make up is itself a square, not because he sees that these things must be so, but because to the eye they look as if they were.*"[942]

Dealing with this objection is even more crucial than in the case of the two objections previously discussed because it so nicely draws our attention, once again, to the empiricist *mechanism of self-delusion*: "*… it is on the evidence of his eyesight and not of any clearly apprehended relation between universals*," and: "*… not because he sees that these things must be so, but because to the eye they look as if they were*" (loc. cit., p. 18). For an empiricist, mere "*eyesight*" is all you need to realize connections, just as Locke, as we have seen, conceived of *simple ideas* as something that comes to our mind, fully differentiated, like the legendary roast pigeons of lotusland. The entire process of questions and answers is simply ignored. What was made clear, in the previous chapter, with respect to the processes that go on in chess – namely that there is no insight to be gained by merely looking at the chessboard and the pieces – also applies to David Ross' argument. Nor can the fact that upon some suggestion or other, the novice finally begins to "see" certain simple combinations be attributed to

941 Sir David Ross, Plato's Theory of Ideas, Oxford University Press, London 1951.

942 Sir David Ross, Plato's Theory of Ideas, Oxford University Press, London 1951, p. 18.

"*eyesight*" alone, for even though his eyes are, of course, involved in the process, his moves are primarily *thought*. Secondly, connections such as "*triangles have areas equal … to*," "*twice the size, half of the given square*," "*is itself a square*," are the very things that are not seen but *thought*. Now, there are two reasons for me to further follow Vlastos' argumentation: the first one is that I want to be done, once and for all, with refuting Sir David Ross' weak and typically empiricist but actually misguided objection regarding "*sense experience,*" but, secondly, I also want to show how *a priori insight*, i.e. the correct alternative presented by Vlastos, actually depends on *visual thinking*.

With this, we have reached a crucial point, which is also the very point I propose to clarify, in the context of our discussion of the *visual turn*, by analyzing Plato's *Meno*, for now there obviously are three possible explanations of *HOW* the slave boy's insight into the solution of the geometric problem was gained:

– firstly, *visual thinking* on the basis of the *geometric diagram* (as presented by Marcus Giaquinto), which ultimately leads to the mathematical insight into the problem and is the defining element of the problem-solving process;
– secondly, Sir David Ross' objection, various nuances of which have time and again been put forth by empiricism ("*undermining*"!), i.e. that the slave boy was largely led on by Socrates' questions and had more or less found the solution by *eyesight*, i.e. that the solution of the problem was primarily due to *sensory perception* rather than logical judgment and the gaining of insight;
– thirdly, Gregory Vlastos' view that this is a case of *purely logical insight* – presented with the aim of demonstrating that *insight* is gained by a priori thinking in terms of "*recollection*" – which could as well be gained (as we will see) by means of an arithmetic instead of a geometric problem, or by a common brain-teaser.

As I see it – and we have gone far afield to justify this conclusion –, the correct solution to this millennia-old problem results from the a priori conceptual structure of the Socratic questions that led to the slave boy's step-by-step insight and, *in addition*, from the final *insight*, the *aha effect* brought about by *visual thinking* and the *intuitive evidence* (as in Descartes) made possible by the geometric figures and the auxiliary lines! Both levels can be involved at the same time, but they are *two different ways* of thinking. This is the only way to solve the *Meno* problem "without remainder." None of these three paths alone leads to the solution. What is crucial, however, is the "*click of understanding,*" the immediate mode, or moment, of insight, and in this respect, the geometric representation is the decisive catalyzing element.

But let's get back to Gregory Vlastos and see how he invalidates Sir David Ross' objection that the slave boy's understanding was an effect of "*eyesight*" alone. Vlastos starts with the interesting observation that the *Meno* offers a more or less unique opportunity for us to observe the argumentative unfolding of a Platonic dialogue (from 2.300 years ago) since the use of a timeless geometric problem allows us to follow it "ostensively," as it were.[943] We have previously shown that what is made *ostensive*, irrespective of whether by showing or by other means of visualization, is always already, if unknowingly, geared towards *visual thinking*, since nothing at all can be thought on the basis of mere "seeing," that is, the stimuli on the retina. To refute Ross' argument, Vlastos then uses a fictional dialogue where he presents a simple arithmetic problem, not unlike the one in the *Meno*, that is solved by way of computation but, and that's the point, without "*eyesight*." In the process, the same sequence of question, answer, bewilderment and, finally, insight occurs, just as in the original dialogue:

"*In this fairly stringent sense my arithmetic dialogue could be said to be equivalent to the geometric one in the Meno; and this appeal to sensible objects has been dropped.*" (loc. cit., p. 147)

Basically, Vlastos is right, for what is at issue here is not the step-by-step gaining of *a priori insight* by one's own thinking, irrespective of whether the problem at hand is a mathematical or a geometric one. Vlastos keeps emphasizing that while Plato never speaks disparagingly of seeing and perception, his reference point for "true" seeing, namely seeing "*with the eyes of the mind*," is geometric figures. Consequently, Vlastos quotes the analogy of the divided line from the *Republic* (510d-e):

"*…when mathematicians use visible figures and make their arguments about them, they are not reasoning about* them*, but about things which these visible figures resemble…; they use these figures as images, seeking to see those very things which cannot be seen except by the understanding.*"[944]

Vlastos also anticipates the objection that the – mathematically uneducated – slave boy might have had this knowledge from some other source, since Plato's experiment explicitly required a test person who mastered the Greek language but was otherwise uneducated. Vlastos suggests that the boy might have learned simple additions with the aid of pebbles. But just as in the case of Kant's much-quoted example of a synthetic a priori thought operation (7 + 5 = 12), the slave boy would at least initially need

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943 Gregory Vlastos, Anamnesis in the Meno, Dialogue: Canadian Philosophical Revue/Revue canadienne de philosophie, Vol. 4/2, 1965, p. 143.

944 Gregory Vlastos, Anamnesis in the Meno, Dialogue: Canadian Philosophical Revue/Revue canadienne de philosophie, Vol. 4/2, 1965, p. 144.

to use his fingers or some pebbles to understand the arithmetic problem, in the first place, which would, however, imply that *intuition* or, more precisely, *visual thinking* was involved! The literature on Kant abounds with more or less contrived objections and arguments why the above example is, in fact, not synthetic a priori but only analytic. But since the objection could theoretically be that in this case, the slave boy might already have had some rudimentary arithmetic knowledge and would, therefore, not be entirely naïve in terms of previous knowledge, Vlastos switches to yet another strategy by introducing an ancient riddle:

"*Brothers and sisters I have none;*
*But this man's father is my father's son.*" (loc. cit., p. 148)

Here, logical reflection will quickly reveal that the sought-for person is no other than the person who poses the riddle. As soon as the slave boy has been led towards the solution by the sequence of questions and answers, the sudden "*aha effect*" occurs, and again new knowledge is acquired thanks to latent knowledge that the slave boy must already have had. In this case, the solution can be found by a priori logical reasoning without the need to fall back on "*eyesight*" or previous mathematical knowledge in whatever form, which shoots down Sir David Ross' rather weak argument that all the slave boy needed to find the solution was seeing, or reading-off. But this can also be shown if one follows the *Meno* dialogue such as it is, for the key to the solution of the geometric problem will, of course, always be a priori *visual thinking* – insight -, and never *sensory perception*.

For a rough outline of the pivotal scene of the *thought experiment* in the *Meno* dialogue, I now propose to follow Jacob Klein's commentary, which will enable me to make it quite clear that in Plato, the a priori insight is from the start inextricably linked to *visual thinking*, "*seeing with the eyes of the mind*"! Most of Klein's commentary had already been conceived in the years preceding World War II, but due to the fact that Klein had to flee from Nazi terror to the USA it was published as late as in 1965. Klein's reference is Aristotle's *Prior* and *Posterior Analytics* where Aristotle not only invokes the *Meno* but even refers to learning as "recollection" as well as to "Plato's problem," i.e. that one cannot learn what one doesn't know because one doesn't know what to look for, or because one has always already known it.[945] Klein then describes the famous scene in Meno's house where Socrates (Plato's voice in the dialogue) tells Meno that he will carry out an *experimentum crucis* to demonstrate that "*learning*" in the sense of acquiring new knowledge means "*recollection*."

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[945] Jacob Klein, A Commentary on Plato's Meno, University of Chicago Press, Chicago/London 1989, p. 35; Aristotle's Prior and Posterior Analytics: A Revised Text with Introduction and Commentary, Oxford University Press academic monograph reprints 2000 (Prior Analytics II, 67a, (Posterior Analytics I,71a).

To this end, a slave boy from Meno's household who speaks Greek but is otherwise uneducated and without mathematical knowledge is summoned to serve as the "test person" by whom Socrates seeks to demonstrate to all those present that to generate new knowledge, no educational background is required, i.e. that all that is needed is the *natural* powers of the mind. He does so by presenting the slave boy with a non-trivial geometric problem and making him solve it by "recovering" the solution from within himself. Learning is supposed to happen by what Socrates calls "*recollection*." But the term of learning can describe more than one thing, and this experiment is obviously not about learning as in "learning by heart" or "learning by doing" but about learning as "understanding something" or, rather, "*learning something new*" by applying knowledge – "latent previous knowledge" – one already has (namely forms, ideas, gestalts, categories, if still vague at this point) to a problem in order to understand logical facts and connections and, thus, find the solution (and not any solution, but the correct one!). According to *Karl Duncker*, already previously quoted, a *problem* arises when a living (in our case, human) being wants to reach a goal and doesn't yet know how to reach it. Jacob Klein explains the ingenious structure of Plato's dialogue where "learning" actually happens at *three levels*: firstly, there is the dialogue between Socrates and the slave boy, in the course of which the slave boy solves a non-trivial geometric problem and acquires new knowledge by "recollection;" secondly, and also in the course of this dialogue, Meno learns that even a quite uneducated person can acquire new knowledge by recollection; and, thirdly, there is the reader who, by understanding what happens, is enabled to observe within himself how the process of gaining a priori knowledge works. And this increase in knowledge, this gaining of insight, becomes obvious and demonstrable precisely because it happens "in plain sight," by means of a geometric example.

Technically, the problem presented to the slave boy can be described as follows: with a given square, what is the *length of the sides* of a square whose area is twice that of the given square? Socrates uses his stick to trace a square in the sand and tells the slave boy that for simplicity's sake, the length of each side will be 2 feet, and also traces the respective lines. Here Klein points out a detail that has escaped many a commentator, namely that the sought-for side will involve "*incommensurable magnitudes*" and that its length cannot be indicated in concrete numbers.[946] This is an important observation because due to its incommensurability and the resulting irrationality, the *diagonal* was an irritating problem that compromised the harmony of the Greek world view and shook ancient

[946] Jacob Klein, A Commentary on Plato's Meno, University of Chicago Press, Chicago/London 1989, p. 99.

Greek thinking to the core;[947] all of which, however, is not at issue in the dialogue. In contrast, what is at issue, and what is made quite clear is that the solution to the problem cannot to be found in terms of numbers, i.e. by computations of whatever kind, but will be *demonstrable* by a *visual* insight only – knowable with "*the eyes of the mind*."

Thus, Plato's *experimentum crucis* (which will never be repeated or touched upon in any of his dialogues) is from the start geared to a solution that can only be reached by *visual thinking*, sudden *insight*, and not by arithmetic calculation or measuring. Why does Plato deliberately choose a geometric problem right in the middle of a dialogue that is actually about whether or not virtue can be taught? Why is it so important to him that this is a geometric *figure* (a *schema*, a "*gestalt*," as it were)? Oliver Hallich, being acutely aware of the issue, emphasizes that in the previous course of the discussion about the concept of virtue, there is nothing to indicate this experiment. Somewhat speculatively, it could be argued that a geometric problem has the merit of being there for everybody to see: while all those present, the onlookers, the person posing the questions, and the test person himself, "see" the same thing, the solution can only be found by means of logical a priori operations which, in contrast, are not obvious. This is not unlike what can be observed when a game of chess is played with large pieces in a park: the bystanders' attention is entirely focused on the pieces, only the experts "see" = think the best moves. So, one argument could be that using a geometric problem allows for a cognitive process to be step-by-step figuratively represented and made visible. But there is another line of thought that rather focuses on the connection, already addressed by Stenzel, between the "vision of ideas" and *visual thinking* in geometry. Oliver Hallich argues:

"*In this, mathematics* (and in particular geometry, my note) *whose objects, the mathemata, are ontologically located between the idea and the world of the senses is identified with the level of knowledge, or level of insight, of recursive thinking (dianoia) which, in turn, is demarcated from mere opinion (doxa) that focuses on visible objects, on the one hand, and the intuitive vision of ideas (noesis) that constitutes cognition in the proper sense, on the other. Here, mathematical* (or, rather, geometric; my note) *cognition is, thus, the preliminary stage of the vision of ideas*."[948]

In addition to these systemic considerations, Hallich notes that mathematics and geometry are examples par excellence of "*knowledge of connections*," that is to say, knowledge that is not based on an understanding of individual propositions but on an understanding of connections (loc. cit., p. 104) – a view I can only endorse.

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947 Ernst Cassirer, The Problem of Knowledge. Philosophy, Science, and History since Hegel, New Haven and London, Yale University Press 1950, p. 52.

948 Oliver Hallich, Platons 'Menon', Darmstadt 2013, p. 103.

So, the square having been traced in the sand, the slave boy is at first completely at a loss, which is hardly surprising since he had never before had to solve such a problem. Therefore, Socrates begins to pose his questions:

"*The side of this space here (pointing at the figure) is two feet long. What will be that of the other space which is double? Boy: 'Obviously … double that length, Socrates.' … The boy is quickly refuted. Socrates … draws four lines, each twice as long as each line in the previous drawing and, by a series of questions, lets the boy see that the resulting 'square space' is four times the previous one, while only a double one was wanted.*" (Jacob Klein, loc. cit., p. 101)

Thanks to the drawing, and relying on *visual thinking*, it doesn't take the slave boy long to realize his error. By further questions, Socrates now makes him see that although the length of the side cannot be specified numerically, it must nevertheless be between the two feet of the original square and the four feet of the – wrongly doubled – square. The slave boy's answer now is "three feet," three being between two and four. Since this results in a nine-foot square, quickly drawn in the sand by Socrates (see upper right figure in Klein, p. 101), this attempt, of course, also fails. Now Socrates directly *exhorts* the slave boy to give a precise answer: show us, *by drawing*, the *line from which* the double square results. Again, Jacob Klein notes, Socrates suggests a visual rather than arithmetic solution. Now the boy is definitely at a loss, as Klein comments: "*His aporia is evident*." What follows is the decisive phase of the thought experiment:

"*And it is Socrates again who finally draws diagonals inside the four squares (each equal to the given one) that constitute the new figure. Each diagonal cuts each of the small squares in half and all four diagonals are equal in length, as the boy can see (or thinks that he can see). Socrates invites the boy to consider the space contained by these diagonals and asks: 'How large is this space?' The boy has no answer; he cannot follow Socrates at this point. All he says is: 'I don't understand'.*" (loc. cit., p. 102)

So far, the description of the dialogue seems very realistic to me, and it may well have happened in this way on the occasion of a similar experiment at the Academy.

"*Through a series of questions it becomes clear that that space (four halves of the small squares) is precisely the double of the given squares. The solution of the problem is at hand. 'From what line (does the double square result)?' asks Socrates. And the boy, pointing at the diagonal, says: 'From this one'. With considerable gravity Socrates puts a seal on this conclusion: 'If 'diagonal' be the name of such a line (as the 'experts' call it), then, as you, Meno's slave say, the double space results from the diagonal.' The boy has the last word: 'Very definitely so, Socrates!'*" (loc. cit., p. 102)

This concise conclusive remark is not only of epistemological relevance, it includes an important humanist component whose aftereffects can hardly be overstated. After all, it is an uneducated slave boy who had been delib-

erately chosen by Plato for the *experimentum crucis* and had, by his own thinking, generated a new insight, that is, had learned something new. Considering that after the stagnation due to medieval Aristotelian philosophy, Plato's writings came to be received by such eminent European intellectuals as Marsilio Ficino or Pico della Mirandola,[949] this dialogue could not fail to impact on the initiation of emancipatory enlightenment thinking. Oliver Hallich emphasizes this aspect, as well:

"*So, in the dialogue with Socrates, it is the slave boy and not Meno who gains the insight. This suggests a universalist conception of cognition: it is made clear that cognition does not depend on the level of education, let alone the social status, but is in principle accessible to everyone. (…) This can also be seen as suggesting an egalitarian outlook in Plato that implies a levelling of social differences. … Someone from the bottom end of the social scale is presented to those of a higher social standing as an example of the possibility of knowledge acquisition.*"[950]

This aspect is important primarily because it reduces the entire conception of Popper's "*The Open Society and Its Enemies*" – stylizing Plato as the originator of totalitarian Führer states – to absurdity. The very opposite is true, as Hallich rightly emphasizes: Plato propagates a "*universalist concept of cognition*" based on a certain "*egalitarianism*," just as Plato is at the source of European Enlightenment! Ernst Cassirer, in particular, has emphasized the crucial role the "return" to Plato's idealism played in the emergence of modern philosophies, the sciences, and enlightenment at large:

"*In Renaissance philosophy, the return to idealism was tantamount to a return to Plato. Not only the most profound speculative thinkers of the Renaissance but also those committed to empirical research build on Plato and seek to find in his doctrine the intellectual tools which will allow them to create a 'nuova scienzia,' an exact science of nature. In this, Nicolaus Cusanus, Kepler, and Galilei all follow the same path.*"[951]

Having thus gone through the core passage of this famous dialogue, we can now, in a first step, objectively conclude the following. Although Socrates had from the start hinted at the incommensurability of the sought-for line by suggesting a kind of "auxiliary line," it would arguably have taken a very long time for the slave boy in search of the solution to the problem thus presented to *restructure* it, as previously discussed, by focusing on the diagonal rather than the vertical and horizontal lines of the square. But for an illiterate person, this hint would probably have been hard to understand anyway. Secondly, it is Socrates who does the drawing, thus determining the course of the demonstration and prefiguring the

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949 See: Ernst Cassirer, Giovanni Pico della Mirandola: A Study in the History of Renaissance Ideas, Journal of the History of Ideas 3, 1942, pp. 124–144.

950 Oliver Hallich, Platons 'Menon', Darmstadt 2013, p. 100f.

951 Ernst Cassirer, Descartes Lehre – Persönlichkeit – Wirkung, Hamburg 1995, p. 16.

final solution. And, thirdly, there is the fact, clearly ascertainable as I see it, that the slave boy, having been deliberately led into the aporia by Socrates, is finally able to find the solution due to the diagonal drawn in by Plato, that is, quite clearly, by *visual* means rather than, for instance, arithmetic reasoning. While it is true that the entire process from the initial question to the finding of the solution is structured as a step-by-step dialogue, the definitive solution of the problem, that is, the *restructuring* of an seemingly impossible task by the drawing-in of the diagonal, happens rather *suddenly*, as does the visually structured insight of the slave boy that he needs to "fold over" the same-size triangles in his imagination. Therefore, I cannot agree with R.S. Bluck's statement that what Plato describes is a continual process of knowledge building (once again, the "experience error" looms large!):

"*In other words, recollecting is a process: there is no question of a sudden jump from ignorance to knowledge. No doubt the process is better regarded as a continuum than having distinct parts, but it may be useful to notice the stages that are clearly indicated in the dialogue with the slave.*"[952]

Of course, problem-solving – from the initial question to the hypothesis to the aporias and wrong tracks to the grasping of the solution, the occurrence of the *aha effect*, or popping-up of sudden *insight* – is a coherent process, a thought experiment. But while it is quite possible to describe even a sexual act – if I may be forgiven the analogy – in empiricist terms as a continual build-up of "pleasurable sensations," i.e. a continual accumulation of "experiences," not even a die-hard empiricist would describe the orgasm other than as a *sudden*, significant, distinct, singular occurrence that, qualitatively, doesn't even begin to compare with the stages that lead up to it (at least I hope so for him, otherwise he should perhaps make sure by first consulting the Oxford Standard Dictionary …). The same is true for the "*sudden jump from ignorance to knowledge*." There is no gradual accumulation of knowledge, there indeed is a zero-to-one quantum leap. The continual process leads up to the leap but *it is not the leap*!

Let's now return to Jacob Klein's commentary to help us better understand precisely what happened in this *thought experiment* and what are the potentially critical points to be further investigated. In this, I will follow Klein's commentary rather closely since, in my opinion, it is the most subtle one, and the one that is most true to Plato's actual line of thought. Klein first examines whether answers were put into the slave boy's mouth by Plato's questions, i.e. whether the sought-for insight was gained not by the boy's own thinking but simply by his parroting of Socrates' words:

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[952] R.S. Bluck, Plato's Meno, Cambridge University Press Cambridge 2010 (1961), p. 15.

"*Only a few of Socrates' questions, in fact only the one immediately following his first exhortation and those immediately preceding his second exhortation, are calculated to elicit patently false answers from the boy. But these few are indeed decisive for the exhibition. Furthermore, the direction that the inquiry takes is completely determined by the order of the questions that Socrates asks. Finally, it is Socrates who draws all the figures and, above all, the diagonals on which the solution of the problem entirely depends. It can, therefore, be justly said that Socrates puts the answers into the boy's 'mouth.' Does he put them in the boy's 'mind'?*" (Jacob Klein, loc. cit, p. 103)

Thus, rather that evading the question, Klein quite openly faces up to it:

"*All questions Socrates asks, except the main one, permit only three types of answer: (a) 'yes,' (b) 'no,' (c) the result of some counting or reckoning. Accordingly, the boy's replies are either straight in the affirmative (most of the time, in fact), or straight (and even emphatically – 83 b 7) in the negative, or simply arithmetic. There are only three deviations from this pattern, all related directly to the main question: (a) the boy's emphatic assertion of ignorance ('I do not know'– 84 a 2), (b) his initial helplessness with regard to the square formed by the four diagonals ('I do not understand' – 85 a 4f.), (c) his pointing to the diagonal (85 b 2). The 'arithmetic' answers are all correct, except for the two brought about by Socrates' 'suggestive' questions. The questions leading to the refutation of these two false answers require no change in the pattern of the answers. To decide, then, whether Socrates puts the answers 'into the boy's mind,' or, in other words, whether he 'manipulates' the boy's opinions, means to gauge the significance of the boy's 'yes' and 'no.'*" (loc. cit.)

The allegation that the experiment may have been manipulated is taken quite seriously and explored in all its facets by Klein. Besides, this is an archetypical situation we all are familiar with from our own school days or from teaching our children. Either one provides hints and the child herself works out the solution after some time, or one gets impatient and tells the child the solution in a more or less subtle way. All this doesn't detract from the fact that if one keeps posing questions patiently enough and is very sparing with one's hints so as not to impede the child's own thinking, she will indeed *suddenly* find the *right* (!) answer: "ah – got it!" Our comprehensive discussion, in the preparative parts of this book, of how insight is gained will now also help us to better understand the workings of Plato's *thought experiment*. Thus, the term "insight" was defined as follows:

"*The term insight has been used to name the process by which a problem solver suddenly moves from a state of not knowing how to solve a problem to a state of knowing how to solve it (Mayer 1992).*"[953]

[953] Richard E. Mayer, The Search for Insight: Grappling with Gestalt Psychology's Unanswered Questions, in: Robert J. Sternberg, Janet E. Davidson (eds.), The Nature of Insight, Bradford Book MIT Press Cambridge/London 1995, p. 3.

There is nothing mysterious or mythical about it. Having clarified that the relevant questions could only be answered with a *yes* or a *no*, Klein comes to the heart of the matter:

"*Disregarding for a moment the possibility of our being perplexed, what makes us choose the answer 'yes' or the answer 'no' in the case of a question that confronts us with nothing but this alternative? Do we actually have a choice in this matter? We do, but this choice is not between the 'yes' and the 'no', but between two possible ways of arriving at the answer. We may make our answer depend on something not related to what the question is about, as, for instance, on our desire to please or to harm other people, on the urge to satisfy our vanity … On the other hand, we may make our answer depend uniquely on the matter that the question is concerned with. … If the question asks what we think about a given subject, we would try to find and to state what seems necessarily inherent in, or connected with, that subject. It is this kind of question that both the slave and Meno have to answer.*" (Jacob Klein, loc. cit., p. 103f.)

Klein points out that there is always more than one way to answer a question, depending on the situation and the respondent's overall constitution. However, Klein says, what is at stake here is a concrete question, a concrete problem, and if one wants to give the *right* answer to a concrete question or problem, this answer must *of necessity* be adequate and correct. Therefore, even the answers "yes" or "no" are not arbitrary but of logical necessity. Seen in this light, what Socrates (Plato) actually does is break down the individual steps of problem-solving into "*simple natures*" (as described by Descartes in his *Regulae*), thus making them "readable" for the slave boy's "natural light." What is more, even if the *right* answer was "merely" seen by the slave boy, this would still mean that it is possible to "see" the correct solution to a non-trivial problem. And since we already know that "seeing" alone can never generate correct solutions, this can only mean, as lucidly described by Marcus Giaquinto, that what happens here is *visual thinking* rather than simple "seeing" as Sir David Ross, true to the empiricist mindset, chooses to imagine. Klein goes on:

"*But how can we possibly find the necessity inherent in, or connected with, a given subject matter except through and in our thinking (dianoeisthai) about it? The choice we have, so far as our answering is concerned, is thus the choice of submitting or of not submitting ourselves to the necessity revealed by our thinking. It is the only necessity that it is in our power to submit or not to submit to. This second way of answering demands from us, therefore, that – while looking for the right answer – we look 'into ourselves', if our thinking can be said to take place 'inside' of us. (We never quite abandon this manner of speaking.) Have we not been witnessing such an inward gaze in the pause which preceded Socrates' reporting the story of 'recollection'?*" (loc. cit., p. 104)

Now Klein begins to tighten the net. If we want to give answers that are *necessarily* (and universally; my addition) right, we have no choice but to

look "into ourselves" with the "eyes of the mind" to see – what? It can only be certain preexisting structures, forms, concepts, categories which, given adequate examination in view of the problem we have seen, can lead us to an answer that is as yet unknown – i.e. new – and at the same time right. Or, as Giovanni Reale emphasizes: "*The slave boy can – like every human being – recover from within himself, that is, from his soul, truths that were not consciously known to him*."[954] Klein, too, stresses this idea, summing it up by the exquisite expression: "*submitting ourselves to the necessity revealed by our thinking*." What more can a human being do? Klein then comes to the conclusion of his argumentation:

"*Regardless of the mistakes we are even then bound to make this 'looking into ourselves' can make us understand, can make us learn, that what the question puts before us is necessarily true or necessarily untrue and can compel us, consequently, to answer 'yes' or 'no,' as the case may be. (…) It cannot be 'induced' or 'manipulated because its source is not 'outside' the person who holds it. It is the completion of our own thinking on a given subject.*" (Jacob Klein, loc. cit., p. 104)

Of course, the slave boy did not find the solution to the problem by simply "*looking into himself*," i.e. searching for innate forms, structures, ideas, categories (still vague at this point). Rather, his apprehension of the geometric problem and the drawn-in diagonal had a positive impact on his movement of thought, as did the teacher's – Socrates' – questions. But according to Klein, the teacher's activity itself cannot be monocausally explained:

"*If there be 'teaching' and 'learning,' their relationship could not be simply a 'causal' one. Teaching does not consist in speaking and insisting, learning not in listening and repeating. (…) But even though the teacher cannot 'produce' knowledge in the learner, cannot 'pour' or 'put' knowledge into the learner's soul, cannot be the 'cause' of his learning, the importance of the teacher in the process of learning matches the importance of the learner's inner constitution.*" (loc. cit., p. 104)

Exploring and explaining this "*inner constitution*" of the learner, or the basic structures of understanding and reason, was, then, the task that *idealism* set itself, culminating in Kant's *transcendental deduction* and Hegel's *Logic*. For as this "live" performance allowed us to see, *sensory perceptions* do not bring us any closer to the solution. And while the *necessary* and the *universal* that is "recovered" from our own thinking is by its very nature "*unobservable*" and, as a consequence, escapes *empirical observation*, it still is the very foundation of any problem-solving. So, what is denounced as "*metaphysics*" by EAN is, in truth, nothing other than this attempt to describe the essential and indispensable functions and

954 Giovanni Reale, Phaidon und Menon, in T. Kobusch, B. Mojsisch (eds.): Platon, Seine Dialoge in der Sicht neuer Forschungen, Darmstadt 1996, p. 78.

elements of any research process, which cannot be empirically observed in terms of *sensory perceptions* but are nevertheless alone capable of leading to the necessary and universal solution of a problem. But – and this is the next important question directly connected with the *Meno* dialogue – what, concretely, does it mean to "look into oneself with the eyes of the mind" and "see" the innate forms and ideas of the mind? Alexandre Koyré offers a similar description of how "recollection" was triggered in the slave boy by Socrates' questions:

"*The slave had never studied mathematics, so at first he makes mistakes. However, he ends by furnishing the right answers to Socrates's questions, obvious proof that he knows what he is talking about, doubtless without realizing it. Indeed, Socrates's questions teach him nothing, they serve only to recall things to his consciousness, to awaken in his soul dormant and unconscious knowledge that it already possessed.*"[955]

## The problem of recollection

The question of what is to be understood by recollection is a crucial issue for *rationalism* and has as such been repeatedly addressed in the course of this study. As it is, Plato's conception, as set forth in his system, of "*looking inside oneself*", that is, accessing the perfect atemporal forms or ideas of the mind which are supposed to always already exist as "latent previous knowledge," gives rise to a number of questions. First, there is the issue, already discussed, of their mode of "existence" – do these ideas exist atemporally and isolated in a "realm of ideas" or are they to be found "*in the soul*" of man, as the mature Plato says in his Seventh Letter? How does the non-ideational world – imperfect but tolerably well conforming to the laws of physics – relate to these perfect forms? Where do these perfect forms, or ideas, come from, and how do they get into the soul (if this is where one chooses to locate them)? And, finally, how is it possible for *every* human being to "access" them in their minds, i.e. how, concretely, are we to conceive of this "vision of ideas"? Thus, the theory of *recollection* is at the core of the Platonic system of the theory of forms, or ideas. It is introduced in the *Meno* and elaborated on in the *Phaedo* dialogue, but the *Meno* is the context where the original exposition of the idea and its illustration by the experiment with the slave boy takes place. From a modern-day perspective, the doctrine of *recollection* could, in principle, be seen as a nascent theory of *a priori* knowledge acquisition that still has a long way to go to be stripped of all mythical elements and have its purely rational essence ascertained and put on a solid intellectual and scientific basis. R.S. Bluck comments:

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[955] Alexandre Koyré, Discovering Plato, New York: Columbia University Press 1945, p. 10f.

"*It may also be true to say of Plato's own theory that 'stripped of its mythical setting, it is the doctrine of all idealist theories of knowledge.'*"[956]

Essentially, what is at issue here is the basic conception of *idealism* that no true cognition is possible without recourse to immutable and *innate* or, at any rate, logically *a priori* existing forms, gestalts, categories, structures, or ideas, or without a disposition to retrieve them in a logically correct way (I deliberately leave open the question) because *sensory perceptions alone*, as repeatedly explained, are absolutely insufficient to lead, of *necessity*, to *universally valid* insights. In this context, Bluck also refers to an essay by D.G. Ritchie, an exponent of the glorious times where English philosophy was primarily oriented to German idealism, and Britain was leading in the world. (Ritchie, by the way, envisaged laying the groundwork for a synthesis of Darwin and Hegel.[957]) Ritchie writes:

"*The doctrine of recollection necessarily implies only the presupposition in knowledge of an eternal element, i.e. an element not dependent upon temporal conditions; it implies the eternal character of thought, not the continued duration of the individual human person …*"[958]

Ritchie thus calls to mind that thinking presupposes atemporal elements, under whatever name, that are already latently inherent in the mind – "tacit knowledge" – and constitute the indispensable basis of thinking. What is called *recollection* is, in principle, nothing other than the *activation* of these forms, gestalts, categories, ideas that are capable of giving a form, a structure and, ultimately, an order and, thus, a meaning to the chaotic world of sensory impressions. Julius Moravcsik very adequately expresses this idealist conception of thinking by emphasizing the interaction between *innateness* and *stimulation*:

"*To say that a concept is given innately to humans is to say that, given proper stimulation and a required stage of maturation, any human will utilize this concept in the interpretation of experience, and that the concept can be shown not to be acquired from experience by abstraction, or by any other known process.*"[959]

In a way, recollection signifies the gaining of insight or, according to other interpretations, the capacity of "learning" or, rather, "learning something new," on the basis of always already existing "tacit knowledge." Similarly, Norman Gulley notes:

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956 R.S. Bluck, Plato's Meno, Cambridge University Press Cambridge 2010 (1961), p. 60.

957 David G. Ritchie, Darwin and Hegel, Swan Sonnenschein, London 1893, p. 38–76.

958 David G. Ritchie, Plato, Mind, XI (1902), p. 353.

959 Julius Moravcsik, Learning as recollection, in: Plato. A collection of critical essays, ed. Gregory Vlastos, Anchor Books, New York 1970, p. 61f.

"*…the fact that without any previous instruction in geometry, the slave is able to recognise the 'truth' of certain propositions in geometry implies that this truth was a possession of the soul before the soul was incarnate in human form (85e–86a). It implies further that the truth is still 'in' the soul in this life (85c, 86a); it is innate; otherwise there would be no possibility of eliciting it in this life. The final step is the argument that what is true of mathematics is true also of 'all other branches of learning' (85e). Thus Plato's claim is that* all *knowledge* is a priori, *in the sense that its source is independent of the experience of present incarnate experience.*"[960]

Gulley's description of the situation is very much to the point, culminating as it does in the statement: "*It implies further that the truth is still 'in' the soul in this life; it is innate*" and the reference to what this fact entails: "*…Plato's claim is that* all *knowledge* is a priori." We have already discussed this claim with respect to Descartes – it can only mean one thing, namely that *all* true insight must draw on *a priori* elements.

A discussion of Plato's systematic reflections on how to solve the eristic epistemological problem would actually have to include the function and position of the *hypothesis* as a form of reason-based best assumption regarding atemporal ideas; which, however, would go beyond the scope of the present study. At any rate, recollection and hypothesis are closely connected system elements in Plato, you can't think one of these functional elements without the other, for the *hypothesis* can be effective in proposing a potentially possible solution of a problem only if at the end of the "second-best voyage," insight into the ideal form, or idea, can be gained by recollection. On the other hand, the *hypothesis*, even though it may ultimately be falsified, is not an irrelevant construct of the individual imagination (as, e.g., in Popper) but already contains the "seeds" of truth since, after all, its construction also involved ideas which included tacit knowledge, hinting at the solution.

Now, as previously discussed, the general problem of the Platonic version of the doctrine of recollection is that while it ingeniously grasps a logically completely correct connection, namely the necessity and universality of the a priori, the proposed solution is regrettably committed to the lights of about 350 years B.C. – the doctrine of transmigration and recollection. While the way the question is raised and set forth by means of the *thought experiment* in the *Meno* dialogue is absolutely stringent and logical in itself as well as understandable, the answer offered in terms of transmigration in its mythical version is, of course, insufficient even though it does contain the essential element, namely that knowledge must already exist and have been passed on at birth. In this sense, as previously discussed, it already contains the "seeds" of reason. This does not mean, however, that it is impossible to come to any satisfactory answer at all, it

[960] Norman Gulley, Plato's Theory of Knowledge, Methuen & Co, London 1962, p. 12.

only means that this it impossible for Plato since ancient Greece simply lacked the scientific basis we can draw on today. But before engaging in the discussion of a possible solution from a perspective of *rationalistic Neo-Kantianism*, I'd like to draw attention to an interesting excursus, in Jakob Klein's *Meno* commentary, that is dedicated to a discussion of Aristotle's treatise "*Peri mnemes kai anamneseos.*" We have already seen that in the EAN world, Aristotle is something of a shining light while Plato is grouped with the fanciful, stoned, mentally deranged idealists. But actually, Aristotle is much closer to his teacher Plato than the EAN mainstream cares to admit, a fact very stringently worked out by Arbogast Schmitt in "Modernity and Plato." In his short excursus, Klein, too, emphasizes that the term of recollection – in the sense of acquiring knowledge by drawing on *atemporal* forms rather than in the sense of remembering impressions and experiences that are always linked to a specific moment – was indeed fully acknowledged by Aristotle even though he did not explicitly mention the doctrine of transmigration. Klein writes:

"*Aristotle's treatise could, in fact be interpreted as a sober commentary on the 'abstracted' content of the dialogue, as a transposition of the action presented there (*Meno*) into a medium free of any mythical encumbrance, as well as of its dramatic or mimetic counterpart.*"[961]

Aristotle, too, holds that memories of material things are like wax seal impressions on the memory and imagination, whereas recollection is indeed conceived of as an activity of the mind that leads to new knowledge:

"*The action of recollection is, in most cases, an active search and Aristotle indicates the rules which govern it or should govern it to make it most successful. In this connection he distinguishes two types of sequences which occur in the process of recollection, one of which is due to necessity, the other to habit.*" (loc. cit., p. 110f.)

Thus, in line with its description in the *Meno*, Aristotle conceives of *recollection* as a gain of knowledge that occurs with necessity, and recommends working out the rules that should govern it. In this, his interest in the habit or practice of recollection is primarily focused on how to employ it in the best and most expeditious way to reach the sought-for *insight*. Still, Plato's basic idea is fully retained, and the emphasis is quite clearly not on the aspect of memory per se but on that of "learning something new":

"*Special care is taken to restrict the reacquisition of knowledge to the action of recollection and to make it clear that knowing is not the business of memory…. Whatever may ultimately make our learning possible, an additional internal source is required for our being able to recollect. This source seems to be no other than the mysterious awareness of having forgotten what we knew in the past.*" (loc. cit., p. 111)

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[961] Jacob Klein, A Commentary on Plato's Meno, University of Chicago Press, Chicago/London 1989, p. 109.

Having thus ascertained that recollection was obviously conceived of, by both Plato and Aristotle, as a cognitive mode, or function of the soul (the mind), and systemically accepted as a way of acquiring, with necessity, new knowledge and, thus, solving "Plato's problem," we have again come to a point already reached in our "*Excursus: Plato's epistemology in the light of rationalistic Neo-Kantianism*." In this sense, I'd like to quote Alexandre Koyré's perfect summary that already foreshadows the next chapter that will deal with the role of the imagination and the senses in Descartes:

"*The lesson, however, is sufficiently clear for us to understand it fully. If Socrates was able to 'teach' geometry to Meno's slave, it was because in the latter's soul there lay vestiges, traces, germs of geometric knowledge.* These seeds of science innate in the soul*, as Descartes was to phrase it two thousand years later, stirred, sprouted, and bore fruit in response to the stimulus of Socrates's questions. But they could develop thus only because the slave, convinced of his ignorance, was willing to make the effort necessary to 'recall' 'forgotten' truths*."[962]

Since in Chapter 4 – *The scientific evidence for innate knowledge, and the downfall of the second empiricist dogma* – we could effectively ascertain a great number of innate capacities and innate ideas, it is now much easier for us to bridge the gap between Plato's insights and modern philosophy. Even Dominic Scott cannot but note, in his *Meno* commentary, that evolutionary biology considerations might help to explain what happens in the course of the experiment (even though he primarily refers to philosophers such as, for instance, Fiona Cowie, who are skeptical about this view):

"*Modern theories, of course, can appeal to evolution to explain why we have cognitive dispositions favouring true beliefs over false.*"[963]

However, to say that evolution has equipped us with cognitive dispositions that favor true beliefs over false completely fails to recognize the structural logic of Plato's account of the cognitive process. The correct solution of a geometric problem by logical reasoning which draws on innate forms and ideas and, thus, leads to a *sudden*, *clear*, and *distinct* insight by a "*click of understanding*" is not a *belief*. To recapitulate how *rationalistic Neo-Kantianism* conceives of a possible solution of "Plato's problem," let's once more refer to James McGilvray' observation in his introduction to the third edition of Noam Chomsky's "*Cartesian Linguistics*." McGilvray, too, sees Descartes as the bridge that leads from Plato to modernity:

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962 Alexandre Koyré, Discovering Plato. New York: Columbia University Press (London: Oxford University Press) 1945, p. 17.

963 Dominic Scott, Plato's Meno, Cambridge University Press, Cambridge 2009, p. 115., FF 26.

"*If much of the mental machinery needed to develop concepts and their combinatory principles is innate and one is going to try to explain how it comes to be in the mind at birth, it won't do to say that God put it there (Descartes) or to construct myths of reincarnation (Plato).*"[964]

McGilvray definitely faces up to the problem that due to the state of knowledge of their times, Plato and Descartes were unable to provide a sufficient explanation for what they had ascertained as the logically correct and necessary way of gaining insight or, in other words, of coming to synthetic a priori judgments. But they still opened the door for what was to come later!

"*The only course open to us is to look to biology and those natural sciences that can say what an infant human begins with at birth and how what s/he is born with develops. And taking that tack also makes it possible to at least begin to speak to the question of how human beings came to have apparently unique machinery in the first place – to address the issue of evolution.*" (loc. cit.)

What has been opened up here, and should indeed be pursued, is the very path of evolutionary biology-based *rationalistic Neo-Kantianism*.

### The role of visual thinking in solving "Plato's problem"

Let's now return to the core issue of this study. In an observation already quoted in the introduction, Rudolf Arnheim argues that in Plato, there are *two* ways of thinking that coexist but remain unrelated:

"*In Plato's dialogues, an ambiguous attitude expresses itself in two quite different approaches, which coexist uneasily. He speaks of gazing upon truth that is the very being with which true knowledge is concerned: the colorless, formless, intangible essence, visible only to the mind, the pilot of the soul.*"[965]

Plato argues conceptually by a series of questions and answers that is in keeping with his dialogical-dialectical thinking, on the one hand, but at the same time uses many *pictorial metaphors*: there is the "*vision of ideas*," the "*looking inside oneself*" and, of course, the contemplation of forms and ideas "*with the eyes of the mind*." Furthermore, geometry, as already indicated by the inscription on the top of the gate to the Academy – "Let None But Geometers Enter Here" –, is clearly at the heart of his philosophy. This is also obvious in the *Meno* dialogue where the geometric *thought experiment* with the slave boy plays a pivotal role, and of course in the *Republic* with its frequent use of geometric figures. In Plato, *visual*

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964 James McGilvray, Introduction, in Noam Chomsky, Cartesian Linguistics, Cambridge University Press, Cambridge/New York 2009, p. 18.

965 Rudolf Arnheim, Visual Thinking, Berkeley 1997, p. 6ff.

*thinking* plays an essential – one is tempted to say "natural" – role, and it is not before Aristotle that thinking is entirely conceived of in terms of propositions, syllogistic logic, the logic of language. Also, Arnheim is not the only one to note Plato's frequent recourse to visual aspects. Bluck, for instance, observes:

"*…and of course Plato naturally and necessarily uses a good deal of imagery and 'picture language.'*"[966]

And just think of Julius Stenzel's previously quoted argument where he draws attention not only to the close connection between a priori recollection, geometry, and visual insight but to the concurrent connection between the universal and the particular, the idea and empirical evidence:

"*Whoever is familiar with the Meno and Phaedo is also familiar with Plato's predilection for mathematical figures as a means of demonstrating the participation of the particular in the universal. What characterizes mathematical intuition is that the particular case does not only represent other cases of the same kind but something definitely other, something of a 'higher' order, an immediate certainty. So, there can be no question of abstracting from particular cases; rather, even in archaic thinking mathematical problems will lead to the insight that unless there is something of a higher order, the particular thing cannot be recognized as something 'on which we set this seal' of being 'that which it is,' as Plato says in the Phaedo; and since, on the other hand, archaic thinking does not lend itself to a representation of this universal – the mathematical in the broadest sense – in terms of concepts, or definitions, as long as visual representation is easy, this thinking always tends to fall back on what is particular and intuitive and, there, to be informed of the content of the universal, all at once, at a glance, (…) by an overview.*"[967]

This peculiar oscillation between the *intuitive* and the *universal*, or mathematically abstract – the tendency "*to fall back on what is particular and intuitive and, there, to be informed of the content of the universal, all at once, at a glance, (…) by an overview*" –, is another clear indication that when it comes to gaining insight by geometric figures, neither *mere intuition* nor *abstract-conceptual thinking* alone will allow us to find the solution of the problem! A *third faculty* is needed to sufficiently explain this form of thinking, this faculty, this "overview," and this term is *visual thinking* as conceived of in the *visual turn*.

To this end, let's once more briefly return to the three interpretations, already discussed, of *how*, *concretely*, the slave boy's insight into the solution of the problem *happens* in the *Meno*. Thus, there is:

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966 R.S. Bluck, Plato's Meno, Cambridge University Press Cambridge 2010 (1961), p. 60.

967 Julius Stenzel, Über den Aufbau der Erkenntnis im VII. Platonischen Brief, in: Kleine Schriften zur griechischen Philosophie, Darmstadt 1956, p. 14.

– firstly, Marcus Giaquinto's view that, ultimately, it is *visual thinking* based on the *geometric diagram* that leads to the solution of the problem;
– secondly, Sir David Ross' objection that the slave boy had more or less relied on "*eyesight*" and that the solution of the problem was, thus, primarily based on *sensory perception* rather than logical reasoning and the gaining of insight;
– thirdly, Gregory Vlastos' argument that this is a case of *purely logical a priori insight* which could just as well be demonstrated (as he ventures to do) by means of an arithmetic problem or classical riddle.

We have previously followed the course of Plato's experiment as described in Jakob Klein's commentary which made it quite clear that there is a sequence of questions and answers, on the one hand, and advances and aporias in the slave boy's reasoning, on the other, that is, a development, or process, driven by logical-a priori reasoning such as it can indeed be found when dealing with mathematical problems or brain-teasers. But we have also seen that Plato obviously chose a *geometric* problem on purpose because he appreciated, and wanted to benefit from, the fact that the visibility of the geometric *gestalt* (*schema*) would allow him to concretely demonstrate the cognitive process to all those present, even though, as previously noted, the course of the dialogue and its subject – whether virtue could be taught – did not really suggest this move. And we have seen that Plato liked to use geometric figures to illustrate the relation between the visible and the "merely" thinkable (the circle, the triangle) as well as metaphors such as, in the "Republic," the *analogy of the divided line*. And this is where Marcus Giaquinto's interpretation comes into play. In a first step, it contradicts Sir David Ross' empiricist reading that "*eyesight*" alone suffices to simply "see" the solution of the problem. To this end, Giaquinto first quotes Norman Gulley who quite rightly, and in line with our own explanation, argues that the experiment was meant as a demonstration of a priori knowledge acquisition, and clearly denies that sense experience has any part in the problem-solving process:

"*Plato in the Meno does not assign any role to sense-experience in discussing anamnesis (recollection); he does not mention sense-experience at all… much use is made of sensible diagrams, but the manner of exemplification of the theory here seems to be dictated by a desire to present the process in as simple and striking form as possible… rather than to stress sense-experience as an essential element in the process.*"[968]

[968] Marcus Giaquinto, Diagrams: Socrates and Meno's slave, International Journal of Philosophical Studies, Vol. 1:1 (1993), p. 83; Norman Gulley, Plato's theory of recollection, Classical Quarterly, IV, 1954.

As any unbiased commentator of the experiment will readily admit, the slave boy must of course see the geometric figures in the sand to be at all aware of them, just as one must first hear a musical theme to be able to grasp relations in terms of harmonics. But the cognitive process is, then, defined by an understanding of the problem and an insight into the solution and is nothing to do with the taking-in of *sensory perceptions*. Marcus Giaquinto indeed acknowledges that the final solution of the problem, found after the diagonals have been drawn in, is something to do with a visual process, albeit not with "seeing" in the sense of "perceiving." So, let's note that a *visual if still undetermined, at this point, process* has indeed been involved in the solution of the geometric problem but that this solution could never be reached on the basis of the "visual image," that is, pure "*sense experience*" alone.

Giaquinto then turns to Gregory Vlastos' interpretation and his insistence that this is actually a demonstration of a priori knowledge that could altogether dispense with the visual component and could just as well be accomplished with an arithmetic problem or a riddle. However, we have already discussed that Plato's choice of a geometric problem was obviously quite deliberate because, firstly, it was of an a priori-logical nature and, more importantly, could be step-by-step demonstrated to all those present. Also, since the aha effect, the "*click of understanding*" brought about by visual means is particularly impressive and comprehensible, Plato probably wanted to benefit from this effect. Giaquinto doesn't deny that using a diagram is, in principle, not the only way to solve the problem, but his strategy here is rather to say that Plato chose the geometric example on purpose and that, therefore, this is what we need to discuss; which is definitely acceptable.

With this, the way is clear for him to address the real issue, namely the role of the diagram in the problem-solving process. Here, Giaquinto argues along two lines. He first explains that seeing a geometric figure is not comparable with seeing, say, a landscape. The square could be slightly lopsided, or the drawing in the sand could be vague and rather schematic, but as long as the essential structural elements of a square are retained, we would still, at a purely visual level, recognize it as this specific gestalt, a square:

"*What is it to see a diagram (or part of it) as a square? It is not to see the diagram and, as a result of this seeing, to believe that it is square; nor is it the diagram's appearing square when we see it.*" (loc. cit., p. 89)

We obviously need to see the square with the two auxiliary lines, yet we basically *think* it as the perfect form, which includes thinking all the *symmetries*, *sides of equal length*, *parallels*, *angles*, and *areas* it contains, for these *relations* are not a matter of "seeing" but of thinking! Similarly, in

chess, a board may well be old and damaged, it does in no way interfere with our thinking the potential combinations, there is no fixation on "seeing," on the purely visual aspect. To come to the final solution of the problem, Giaquinto then chooses a path that is original and interesting but, as I see it, not radical enough, namely Wittgenstein's mode of "*seeing (…) as*" (unsurprisingly, the heading of the relevant chapter is "*Seeing the diagram as …* "). Marcus Giaquinto's outstanding contribution here is to have brought to light a visual mode, the mode of visual thinking, in Plato's *experimentum crucis* and to be, furthermore, fully aware that the final moment of insight cannot be sufficiently explained by either *sense experience* or propositional, conceptual reasoning alone. He quite clearly acknowledges the presence of *visual thinking*:

"*The visual experience that resulted from the use of diagrams was not used as a source of observational evidence for this or that proposition. In this case vision was a means of getting information about things that were not before one's eyes. Seeing the diagram as a geometric figure of a certain sort, seeing parts of it as related in certain geometric ways and visualizing motions of the parts, enabled us to tap our geometric concepts in a way which feels clear and immediate. Here is an a priori mode of mathematical thinking which has hardly been acknowledged, let alone investigated and understood.*" (loc. cit., p. 95)

With this, we are at last approaching the heart of the matter, and Giaquinto brings into play the following essential points: *firstly*, that this is indeed a "*visual experience*" but that, *secondly*, this experience provides information on *contents* that can only be grasped by *thinking*, that is, can*not* be simply read off from the inflow of *sensory impressions* on the retina. As already discussed, the geometric properties as well as all the relations of a square are always "only" thought and not *seen*! And, *thirdly*, there is the fact that in our imagination, we can *move* and *compare*, "*flip*" and "*fold over*" parts and components of the square, such as, for instance, the triangles separated by the diagonal, etc., which calls to mind the discussion of these imaginative capacities in Shepard & Metzler and Stephen Kosslyn. We are capable of turning and rotating objects in the imagination and of thinking up, in the process (and beyond all visible sensory impressions), new groupings or constellations "*in a way which feels clear and immediate*", just as Descartes would have described it. Giaquinto then unambiguously states that this is, *fourthly*, an "*a priori mode of mathematical thinking*" which, however, philosophy has up to now failed to explicitly describe, let alone examine and understand in its nature! With this, the *visual thinking* of the *visual turn* is clearly outlined in all its components, so all we need to do now is boldly take the final step and make it evident, concretely, in its clear and distinct form. At this stage, however, Giaquinto tries to solve the puzzle by the mode of "*seeing (…) as*" brought into play by Wittgenstein. The latter had used the famous "rabbit-duck" image,

among other things, to comment on this visual phenomenon, this peculiar "flip-flopping" of the image from rabbit to duck and back again, and reflect on the phenomenon of "*seeing as … .*" Let's also note that in his *Remarks on the Philosophy of Psychology*, Wittgenstein was already very close to the insight that there is such a thing as *visual thinking* but failed, or refused, to take the decisive step; at any rate, the anthropological and evolutionary biology foundations were still lacking at the time:

"*But does this then show that it can't be a matter of 'seeing' in these cases – but it is one of 'thinking', perhaps? What makes this quite unlikely is that we want to talk about 'seeing' in the first place. So should I say that it is a phenomenon between seeing and thinking? No; but a concept that lies between that of seeing and thinking, that is, which bears a resemblance to both; and the phenomena which are akin to those of seeing and thinking (…)*."[969]

At the same time, we found the rabbit-duck example also in Richard Gregory's discussion of *optical illusions* and *ambiguities* and the phenomenon of how new insights are gained due to the reorganization of the respective figures. Having worked our way through all these aspects and phenomena now turns out to be very helpful when we need to ascertain whether what we are dealing with is mere "*seeing as…*," that is, a form of optical illusion where our visual organs, following the gestalt laws, flip-flop between two competing gestalts, or formations, or rather an actual *rethinking* of the problem, a *restructuration* by thinking, just as the Copernican system was not the result of Copernicus' flip-flopping between two optical phenomena but of his rethinking and restructuring the overall perspective. In Gregory, we have already learned:

"*Ambiguities* (such as, e.g., the rabbit-duck, my note) *can be extremely useful for perceptual research: as perceptions change though the input to the eyes remains unchanged — so we can see what is going on 'from the inside'. So 'flipping' visual ambiguities allow us to separate effects of bottom-up signals from the eyes from top-down knowledge and assumptions. … The more top-down contribution, the less 'direct' is perception. This is bad news for the empiricists seeking certainty for seeing, but good news for those who think of perception as intelligently creative – making effective use of the limited available data to represent what might be out there.*"[970]

However – and this is the crucial point here –, if the impressions keep flip-flopping between the rabbit and the duck image, just as the Necker Cube and similar optical illusions keep fooling us, this is *nothing to do at all* with thinking or grasping, nor does the flip-flopping stop with our increasing knowledge of the facts! So, with respect to the gaining of *in-*

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969 Ludwig Wittgenstein, Remarks on the Philosophy of Psychology, Oxford 1980, Vol. II, no. 462.

970 Richard L. Gregory, Eye and Brain, Princeton University Press, Princeton 1997, p. 206.

*sight*, or "recollection," this approach is insufficient since processes of "*seeing as…*" that go on at the level of visual cognition and object identification are more or less *automatisms* that do not indicate any increase in knowledge, irrespective of whether or not we have understood the figure or the cause of the flip-flopping. I can't keep the Necker Cube from flip-flopping even though I have understood why this happens. The flip-flopping of the rabbit-duck image is neither creative nor is it dependent on one's intelligence or knowledge, the only condition for it to function is that at some point, we have learned to recognize the gestalts of a rabbit and a duck. Understanding the logical elements and intermediate steps of the geometric problem solved (at least in part) by the slave boy, as well as apprehending the *relations* and *functions* (symmetry, identity, side, area, doubling, bisecting, parallel, unequal, unity, transposition, etc.) are achievements that cannot result from "seeing" in the sense of an input of *sensory impressions* alone. Moreover – and this is also the crucial criterion once the *functions* of the diagonal, the areas, the geometric figures and their relations are understood –, they cannot be undone, they are acquired *knowledge*, irreversible and enduring, and no longer subject to the ambiguous reversals that characterize flip-flop images such as, e.g., the rabbit-duck. This is why "seeing as …" is clearly *insufficient* to explain the phenomenon of gaining *insight* by diagrams as demonstrated in the *Meno*!

Thus, the mode of "*seeing as …*" obviously falls short of fully explaining Plato's problem, i.e. the solution of the geometric problem by the slave boy. The situation is different, however, when it comes to the gaining of insight by *restructuring* as conceived of on the basis of the considerations and research work of gestalt theory. In this case, as previously explained, there is a sudden change of perspective, a *rethinking*, that allows us to understand the logical structure of the problem in a different *respect*. The prime example here is the Copernican revolution, the switch from the geocentric to the heliocentric system, which was obviously not due to an optical phenomenon, a flip-flop image, a "seeing as…," let alone the stimulations of the retina. And this is also precisely the kind of restructuring that led to the solution of the geometric problem in the *Meno*. For after the boy's aporetic attempts to approach the solution by way of the length of the sides of the square, it is a rethinking of the problem, its visual restructuring by the *diagonal,* that enables him to find the solution. In the dialogue, it is Socrates who draws in the diagonal and, thus, makes it easier for the slave boy to find the solution. But understanding the consequences of this "auxiliary line," i.e. grasping, by thinking, the function of the triangles thus created and, as a result, being able to understand, by his own thinking, the consequences of this restructuring – all this was still up to the slave boy himself. It could be argued that this is the weak point of the experiment, but there still must have been someone, at some point,

who solved the problem, who experienced the restructuring, or "bisociation," or aha effect, and gained the fundamental insight. As it is, the slave boy's self-gained insight into the relation of the areas and the function of the diagonal alone would suffice to warrant a positive outcome of the experiment.

With this, the insights worked out so far enable us to come to a conclusive evaluation of the *Meno* dialogue and the problem raised by Plato in the form of the geometric problem, as well as to a first definition of *visual thinking* and a description of its potential. To recapitulate: the question dealt with in the *Meno* had been how it was possible for any normally endowed but otherwise uneducated individual to gain universally valid and necessary new knowledge by accessing innate forms and ideas, with sensory impressions acting as a trigger or stimulation but obviously never sufficient as an answer to "Plato's problem." The solution of the *thought experiment* conducted in the *Meno* happens, as shown, at *two cognitive levels* and serves as a paradigm for all problems of a similar nature: at the *dialogical-conceptual-linguistic* level defined by the interplay between Socrates' hypothetical-maieutic questions and the slave boy's errors, insights, and answers; and at the *visual-cognitive* level where, triggered by the drawing-in of the diagonals, the actual solution of the geometric problem is ultimately found by the slave boy himself. Therefore, what must have come into play to enable the slave boy's sudden *insight* – in the sense of an aha effect – is a mental faculty "*between seeing and thinking*" (Wittgenstein) that, in turn, as shown in detail in the above, is neither *conceptual* nor *sense-based* and can, by now, be more accurately defined as the *faculty of visual thinking*; which is the only remaining option for explaining the solution of the geometric problem in the *Meno* since both "*eyesight*" and purely *conceptual* reasoning have been shown to be insufficient. At the same time, all the preparatory work in the present study has paved the way for us to come to a plausible and logically stringent understanding of the *faculty of visual thinking* such as it could develop in man's long "speechless" period up to about 50,000 BP. At the decisive "interface," seeing and thinking have grown together to form a novel faculty that is able to achieve this synthesis. This, then, is the basis we can now, 2,300 years after Plato, rely on to propose an adequately differentiated and meaningful solution of the question raised by him in the *Meno* and *Phaedo* dialogues:

1. The initial problem, to once more summarize it as stringently as possible, is that we cannot know what we are searching for, or would not be able to recognize it when we found it, because we do not yet know it. In Noam Chomsky's version, this is the *poverty-of-the-stimulus* argument: when we solve a problem (in linguistics, grammatically correct *language acquisition*), the input – information – we

receive from the "outside," be it sensory impressions, sounds, or words, is always *too poor* to explain the achievement accomplished by every normally endowed but otherwise uneducated individual (in Chomsky: learning the grammatically correct mother tongue, in the *Meno*: solving the geometric problem). Therefore, there *must* be another mental faculty that is structured so as to, in principle, enable every normally endowed human being to learn the grammatically correct language rather than produce some random gibber, or to find the *correct* solution of the geometric problem rather than end up with some haphazard geometric figures.

2. This necessarily leads to the assumption that at birth, every normally endowed homo sapiens always already *dispositionally* has a faculty of thinking that is structured in a logically sufficient way and, when adequately matured like every other biological function, enables him or her to apprehend "*simple natures*" as described in *Descartes*, speak a conceptually correct language, and think in concepts. So, human beings dispose of, *firstly*, *intuition*, that is, a way of *organizing* sensory impressions in terms of space and time and according to the *innate laws* of *gestalt theory* that enable us to structure the field of vision and warrant *figurative synthesis* as set forth by *Kant* in the *Transcendental Aesthetic*; and, *secondly*, as a result of the long evolutionary period without language, the *faculty* to not only *figuratively imagine* things but to *actively handle* these visual objects in our imagination, that is, *carry out operations* and *experimental arrangements* that per se go far beyond "seeing," and at the same time employ it to perform logical operations. This enables problem-solving *without* recourse to language, examples being tests conducted with deaf respondents, thinking in chess, and non-trivial geometric problem-solving as demonstrated in Plato's *Meno* dialogue.
3. In terms of efficiency, *visual thinking* is in an intermediate position between "seeing" in terms of gestalt theory and "conceptual" thinking; as such, it is absolutely sufficient for solving problems such as those raised in the *Meno*, even if the test person has no educational background whatsoever. The *faculty of visual thinking* is clearly inferior to conceptual thinking in many domains, especially when dealing with abstractions and non-concrete problems. But it clearly outperforms conceptual thinking when what is at issue is visual judgment, primarily in contexts that require fast visual thinking in terms of connections. Reliance on spoken text in blitz chess, or when driving a car, is obviously doomed to fail.
4. The way the faculty of *visual thinking* "grasps" concrete problems is consistent with Descartes' description of the process of apprehending "simple natures," of their being intuitively grasped by the "natu-

ral light," that is, *intuitive evidence*. This happens *suddenly* and is equivalent to what has been described as the "*click of understanding*" and the *aha effect*, or the *sudden restructuring* of a visual problem. It is also equivalent to the mode of *insight* that is an essential element of the doctrine of *rationalism*, whether in Plato, Descartes, or Leibniz. In fact, what Socrates does in the *Meno* is help the slave boy by breaking down the geometric problem into individual sub-steps, that is, to the level of "simple natures." It is only then that the slave boy's "natural light" can grasp the "simple natures," or "click in" to enable him to produce the solution to each sub-step by himself. As long as there is more than one sub-step, the problem remains too complex, and he is lost! At the same time, the faculty of *visual thinking* is at the basis of *synthetic a priori judgments* (at least when dealing with problems that can be visually represented), for by now, we understand in more than one respect how it is possible for us to come to judgments that go beyond purely analytical analysis, or beyond known facts, and think up new knowledge in a process that is neither detached from nor controlled by sensory perception. The faculty of *visual thinking* is indeed the first and most genuine *prototype* of what Kant, in the context of *conceptual* thinking, describes as synthetic a priori judgments. But it *is* not yet conceptual thinking, it is only its preliminary stage.

5. Evolutionary biology has structured the dispositionally *innate* forms and ideas so that they enable us to acquire knowledge that is largely sufficient for life on earth. They are geared to *three-dimensional space* and an internal sense that has a *temporal structure* and comprises simple elements such as the numbers one, two, three, arranged on a spatial number line in the imagination, simple elements and figures of Euclidean geometry, face recognition, elements of folk psychology, and the structures of simple logical operations and forms of judgments in terms of categories. It was not until the Cartesian and the Kantian "*revolution in thinking*" that the evolutionarily developed faculties and "instruments" of knowledge were understood to be the key to a rational knowledge of the mental and empirical world. Without them, the uneducated and *illiterate* slave boy would never have been able to decide whether to answer the questions posed by Socrates with a *yes* or a *no*, whether 4 feet is twice as long as 2 feet, whether a diagonal of a square drawn in the sand bisects this square into two triangles of *equal* size, whether the areas formed by the triangles are *twice* as large, what equal and *unequal* means, how sides *relate* to areas, and so on. There must already be a potential disposition to know all these "*simple natures*" since otherwise, we would never be able to "get into" thinking at all, there would be no way for us to ac-

cess it (which is why Socrates breaks down the problem into its elementary sub-steps), and most of these "basic elements," these "simple natures," are of a visual nature because this is, of course, the very basis that allowed for the faculty of visual thinking to develop at all before it evolved towards conceptual thinking.

6. Since in terms of evolutionary biology, the faculty of visual thinking is older than that of conceptual thinking, it is highly plausible to assume, as Richard Gregory does, that there also is a visual *grammar of seeing* that is largely consistent with the laws of gestalt theory. In the course of hundreds of thousands of years of more or less "speechless" thinking, this evolution of a visual organization of seeing obviously resulted in a structured form of visual thinking that basically followed the laws of gestalt but grew out of them and adapted to the *principles of physics* that prevail on earth, or in the universe. At some point, then, the need felt by humans to express themselves, in conjunction with various other social interactions and constraints as well as the emergence of self-consciousness, led to the development of language. It seems rather obvious – and here we again follow Gregory's argumentation – that the structure of visual grammar strongly resembles that of innate universal grammar as discovered and described by Noam Chomsky since the former is what the latter developed from; and that, in purely biological terms, all functions are arranged so that the higher and the lower ones work together with and complement each other and remain functionally connected. This conception of the interplay between the two faculties of conceptual and visual thinking seems plausible enough and can also explain those situations where we need to resort to a verbal description of a mechanism already visually understood, or are "lost for words" when trying to adequately express something we have already clearly "seen," that is: visually understood."
7. All the elements examined up to this point perfectly fit together to describe the faculty of *visual thinking* in its origin, functionality, and efficiency. With respect to the *Meno*, this means that the real solution of the geometric *thought experiment* happens in the way described by Marcus Giaquinto. His explanation further gains in strength and even becomes irrefutable as soon as we see it as based, not on the insufficient mode of "seeing as…" but on the *faculty of visual thinking* such as it was already de facto described by Descartes in the *Discourse* and, even more clearly, the *Regulae*.

So, to further describe this faculty and come to a better understanding of its specific nature, we will now turn to the foundation of *visual thinking* in Descartes.

## IV. The role of visual thinking in Descartes: *simple natures* and the *natural light* – the founding of modern rationalism

In more than one way, René Descartes plays an outstanding role in the history of philosophy, mathematics or, rather, geometry, but also the sciences in general, as his Optics or the discovery of the laws of refraction alone would suffice to show. Traditional philosophical history tends to focus on the *Meditations*, the founding of the "cogito," and the so-called dualism of *res cogitans* and *res extensa* as well as the turn towards a modern "philosophy of subjectivity," but in my view, Descartes can also be seen in a quite different light, namely as the initiator of a new interest in Plato's philosophy and the thinker who put an end to the Aristotelian dogmatic of the Middle Ages, thus laying the groundwork for modern European thought, the methodical sciences, the free individual and the Enlightenment in general. This quite clearly follows from the structure of his epistemology, the strong emphasis on the nativist component, that is, the doctrine of *innate knowledge*, as well as the occasional reference to "recollection" or the central position of geometry as the starting point for his reflections, but also from his obvious reservations regarding the truth content of *sensory impressions*. Arbogast Schmitt characterizes this parallelism with Plato's thinking as follows:

"*Like Plato, Descartes seeks to trace an understanding- or reason-based path from sense experience to cognition. He is searching for this path to attain certainty of knowledge*."[971]

But there also are the more obvious references to Plato, primarily in Descartes' many letters, that attest to his thorough knowledge of the Platonic dialogues. Descartes' doctrine of rationality, anchored as it is in the creative, spontaneous self-consciousness of the subject, his founding of scientific experience in the naturally implanted laws of the understanding (the "*natural light*"), and the scientific humanism that results from it could not fail to have an impact also on Neo-Kantianism. Thus, Plato's flame, rekindled by Descartes, was carried further, via Leibniz, to the Marburg school, its most prominent exponents being *Paul Natorp*, *Hermann Cohen*, and *Ernst Cassirer*. More surprisingly, in Kant's *Critique of Pure Reason*, Plato and Descartes are rather "underplayed," as we have already noted. This has drawn the occasional commentary and is perhaps best explained by the fact that for Kant, the contemporary doctrine of *ration-*

[971] Arbogast Schmitt, Denken und Sein bei Platon und Descartes, Heidelberg 2011, p. 43.

*alism* was primarily represented by the philosophy of Gottfried Wilhelm Leibniz and Christian Wolff. But for all its creativity, and notwithstanding Leibniz' meticulous reception of Descartes' doctrine, his monadology was kind of a dead end and an impasse for *rationalism*. For our present discussion, Leibniz is an interesting case because of laying the foundation for Cohens philosophy through his infinitesimal calculus on the one side and his attempt to replace the entire geometric-visual element that plays a central role in Plato and Descartes as well as Kant by *mathesis universalis*, calculus, on the other. Leibniz may well be classified as an exponent of rationalism, he is nevertheless often seen with much more sympathy by EAN philosophy, especially its *logicistic* currents, than Descartes is.

In spite of Kant's apparent disregard for and undeserved undervaluation of Descartes, the reception of Descartes has played a key role, from about 1870 onward, in the dynamism and rise of Neo-Kantianism. And in this "rediscovery" of Descartes as a pioneer of a philosophy of reason, it was, more particularly, his early work, the *Regulae ad directionem ingenii* and, with it, his integration of *geometry* and *mathematics* as the model disciplines of pure a priori reasoning, that provided Neo-Kantianism with an important basis for engaging in the philosophical debate about the foundation of the sciences, which had for too long been left to positivism. Here, Paul Natorp's study "*Descartes' Erkenntnistheorie*"[972] as well as Ernst Cassirer's doctoral dissertation "*Descartes' Kritik der mathematischen und naturwissenschaftlichen Erkenntnis*"[973] pointed the way. For Natorp, the *Regulae* are the crucial point of reference because unlike Descartes' much-interpreted and often misunderstood *thought experiment* of the *Meditations*, the *Regulae* offer concrete epistemological reflections which up to then had not been given much consideration and, moreover, contain many elements that are conducive to a science-friendly interpretation of Kant. In one of his first discussions of the *Regulae*, Natorp already seeks to temper Kant's rather reserved attitude towards Descartes:

"*In contrast, in another work, the 'Regulae ad directionem ingenii,' he not only sets forth, with complete clearness, the concept of a science of human intelligence, which is supposed to precede all other knowledge and from which all other knowledge is supposed to derive its certainty, but actually lays the very groundwork for this science, so that the opinion that sees Descartes as one of the primary exponents of the dogmatism condemned by Kant is completely thrown over.*"[974]

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[972] Paul Natorp, Descartes' Erkenntnistheorie, Eine Studie zur Vorgeschichte des Kriticismus, Marburg 1882, p. 133.

[973] Ernst Cassirer, Descartes Kritik der mathematischen und naturwissenschaftlichen Erkenntnis, Paderborn 2012 (1899).

[974] Paul Natorp, Descartes' Erkenntnistheorie, Eine Studie zur Vorgeschichte des Kri-ticismus, Marburg 1882, p. 1f.

This already is a perfect summary of the strategy adopted by the Marburg neo-Kantians. Their aim was to select, retain, and incorporate, by reevaluating the *Regulae* and other, less well-known texts, those fruitful elements in Descartes that clearly reveal him as a precursor and pioneer of Kant's philosophy, and to use this rereading of Descartes to overcome Kant's cool ignorance, on the one hand, and "customize" Kant's doctrine to serve as the adequate basis for a neo-Kantian theory of science, on the other. In other words, at a time of spectacular scientific progress, they sought to preserve Kantianism as a counterproject to the emergent positivist currents and to establish it as the "truer" guiding philosophy for both ethics and the sciences. In another publication that can also be seen as his response to the criticism raised from various sides against his reading of Descartes, Natorp remains true to his understanding of Descartes' philosophy as the connecting as well as anticipatory element of the critical-idealist tradition that was founded by Plato and brought to its "*most mature and most profoundly reasoned-out form*" by Kant.[975] Remarkably, Natorp (he refers to the original posthumous edition of the "Regulae" from 1701 (A), which was the basis for the Adam/Tannery edition as well) at the same time holds on to the thesis that instead of dismissing the *Regulae* as an unpublished early work, they should be read as an exposition of pure reason in action which, from a systemic point of view, could even be said to be purer and more genuine than what Descartes accomplished in the *Meditations*:

"*However, it would be completely erroneous to suppose that since the positing of his metaphysical propositions, Descartes had renounced the achievements of that earlier period. On the contrary, even in the Discourse, he presents his metaphysics as a mere application of his 'method,' as Foucher de Careil quite rightly points out. The method, however, is complete at that first stage, and its essentials are never amended.*" (loc. cit., p. 12)

This statement is important, for in terms of content Descartes indeed departs from the topics of the *Regulae* in the *Meditations* and the *Principles of Philosophy*. For him, the method was established and, therefore, called for *application* rather than discussion. But Natorp goes even further:

"*It is therefore all the more important to emphasize it: the basic idea of Descartes' method already fully implies what can justifiably be called his idealism; and it contains it in an even purer form than what we find in his developed metaphysics.*" (loc. cit.)

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975 Paul Natorp, Die Entwicklung Descartes' von den „Regeln" bis zu den „Meditationen", Archiv für Geschichte der Philosophie, Vol. 10, Berlin 1897 (ed. Ludwig Stein), p. 10.

And even concerning Descartes' position in history, Natorp leaves little doubt:

"*Having realized this, one can hardly fail to see that Descartes' position in the 'Rules' is that of criticism thus defined, or at least very close to it, closer, at any rate, than in any other work of modern philosophy before Kant. Among the ancients, Socrates and (at a certain stage of his philosophy) Plato had already drawn close to this position, thus providing the pattern that Descartes obviously had in mind.*" (loc. cit.)

I fully share Natorp's view, and indeed think that notwithstanding the flak from EAN, neo-Kantian tradition in whatever form would be well advised to not give up on Descartes and not let themselves be led into joining in the customary Descartes bashing but firmly defend this systematic doctrine, first set forth by him in its pure form, for otherwise the above-mentioned parties, having successfully "undermined" Descartes' doctrine, will no doubt proceed to the next step and try to overturn Kant. EAN, the Church, irrationalism, and, at their time, Heidegger and the National Socialists were acutely and instinctively aware, as manifest in their attacks on Descartes, that this is where the enlightened humanist *reason* had for the first time attained its purest and clearest expression and, as such, called for counteraction. In her knowledgeable book "Descartes' Concept of Mind," Lilli Alanen, too, notes that while the *Regulae* may well be an unpublished early work, they should nevertheless not be seen as a stage of development to be overcome in Descartes' major works and, therefore, not worth considering, but as a work that already fully contains the basic ideas of his doctrine, various aspects of which were further developed in his later works:

"*If his early conception of mind was shaped by his thinking about the method and grew out of his effort to give a general account of rules for attaining certainty in science, his later work can be seen as the result of his effort to address the many problems of the mind and its status as a knower, but also about the reliability of clearly and distinctly intuited ideas of simple natures, which constitute the building blocks of true and certain science, and their connection to the world of extending things they are supposed to represent, all call for answers that Descartes was not in a position when writing the never-finished* Rules."[976]

The programmatical interpretation in neo-Kantian terms, already proposed by Natorp, is also shared by Hermann Cohen, for instance in his 1885 work "*Kants Theorie der Erfahrung*." Cohen never wrote a monograph on Descartes, but in this work, the seventh chapter – "*Descartes' Antheil an der Vorbereitung des Kantischen Problems*" – is entirely dedicated to the Descartes as a forerunner of Kant, which alone would suffice to

[976] Lilli Alanen, Descartes's Concept of Mind, Harvard University Press Cambridge/ London 2003, p. 8.

convey an idea of the nature of Cohen's approach. At any rate, for Cohen, the first important Descartes-Kant overlap is their positing of mathematics and geometry as the very starting point of their search for certainty:

"*Thus, like Plato in his time, Descartes again links philosophy to mathematics and makes mathematical certainty the real problem of the philosophical investigation. This is Descartes' invaluable merit and constitutes a real and complete renewal of philosophy, Bacon's efforts in this respect being not even remotely comparable.*"[977]

Being aware of Kant's statement, in the *Critique of Pure Reason*, that "*the concern of this critique consists in [the] attempt to transform the accepted procedure of metaphysics … according to the geometers*" (CPR B XXII) and, thus, to endow the procedure of speculative reason with a similar degree of certainty, we know what Cohen has in mind. He then addresses another crucial, if often neglected, element of Descartes' doctrine, i.e. *innate ideas*:

"*This essence of the mind in which the things are grounded is described by Descartes by the much-contested term of 'innate' (…) What is innate is those ideas that liberate us from the illusion and error of sensory perception and, as such, warrant certainty of knowledge. The innate is to be understood as the criterion of scientific insight and is, accordingly, described and discussed as synonymous with 'universal rule' by Descartes. The innate is the universal rule of knowledge, or criterion of certainty, by which the things in question can be legitimated, provided one succeeds in deriving them from that principle and constituting them in accordance with that rule.*" (loc. cit., p. 29f.)

What is really remarkable here is that Cohen refers to the disputed status of the "innate," on the one hand, but, rather than dismissing it, as he could have easily done at this point (in line with, e.g., Alois Riehl), construes it – in a chapter that leads up to Kant, after all – as "*the universal rule of knowledge, or criterion of certainty,*" and indeed accepts it as an essential element of the cognitive mode that traces back to Plato. Another of Descartes' merits is his epistemic anchoring of certainty:

"*So far, Descartes is the absolutely clear and sure guide for any investigation of the value of insight as such, and the conditions of its certainty.*" (loc. cit., p. 30f.)

He again says so in his legendary work "*Logik der reinen Erkenntnis*":

"*The principle of certainty that is the unitary grounding of the system implies logic as the basis of the system. Before everything else, it is this orientation that makes Descartes a modern systematist, the founder of modern systematics.*"[978]

But it is Cohen's third reflection that is most important for our present discussion. There, he points out an ambiguity in Descartes' doctrine, al-

[977] Hermann Cohen, Kants Theorie der Erfahrung, Berlin 1885, p. 27.
[978] Hermann Cohen, Logik der reinen Erkenntnis, Berlin 1902

ready previously referred to by me, namely that the self-consciousness of the ego is anchored in and grounded on the cogito, on the one hand, but that as a result, the relation between this cogito and all the "*simple natures*" previously found, in geometry, by *intuitive evidence* become unclear again. This problem is of relevance for the smooth functioning of Kant's doctrine since it would, of course, affect the argument of the intuitive, or the role of intuition, in mathematics and geometry. Cohen constructs his argument by first giving a rough outline of the way Descartes anchors the certainty of the criterion in the cogito:

"*As it is, however, Descartes chose to generalize the rule and objectivate the criterion by anchoring it in the* cogito ergo sum, *the self-consciousness. In so doing, Descartes introduced a double orientation. (…) The cogito is the expression of the criterion. So, with the cogito being constitutive of the 'sum', thinking that meets the criterion was made, in accord with the Platonic postulate, the higher and more comprehensive principle of certainty (…) Innateness, the principle, the criterion, is the essence of the mind, the substance of thinking.*" (loc. cit., p. 31)

But, then, he contrasts this first fundamental anchoring of thinking in the cogito with its foundation, discussed above, by *intuitive evidence* when dealing with examples from geometry:

"*For Descartes, however, it was tempting to level the specific difference between geometric reasoning and other kinds of reasoning: because on the strength of his discovery, he had to ignore this difference. That geometric matters present themselves in ways different from those of pure internal thinking is the fact he chose to ignore, and taught to abstract from, by transforming spatial figures into numbers.*" (loc. cit., p. 33)

This insight highlights Descartes' departure from visual-geometric reasoning in his later works, on the one hand, and foreshadows Leibniz' turn from visual-geometric to abstract-arithmetic reasoning, on the other. And now Cohen explains the reason for his reservations, and why visual-geometric reasoning needs to be restored to its former importance:

"*It is not true that geometric thinking, pure as it may be, is thinking per se. It is not true that with it, sensory imagination is quite incidental and disorienting. Just as the substance of thinking could not absorb that of the res extensa, geometry cannot without remainder be transposed into pure thinking. Therefore, we need to distinguish between thinking and a mode of cognitive activity that is attuned to the specific characteristics of the geometric consciousness. We can see that in both groups of his writings, Descartes is deeply committed to clarifying this specific geometric mode of consciousness: but it is in his posthumous writings that his ingeniosity in distinguishing and characterizing the concept of intuition is particularly striking, as is the degree of precision reached, which is much higher than the one achieved, in the Meditations, for the concept of imagination. … This failure to clearly distinguish pure intellection from imagination and intuition is, then, also to be blamed for the indeterminacy of the concept of self-consciousness.*" (loc. cit., p. 34)

Now, this is interesting indeed: Cohen quite clearly sees that the discovery of the *cogito* may have distracted Descartes from the mode of *intuitive evidence* at work in geometric problem solving as set forth in his earlier writings (*Regulae*), and that in the *Meditations*, in particular, the *imagination* increasingly gains in importance. At the same time, Cohen insists that "*geometry cannot without remainder be transposed into pure thinking*." Following Kant, he holds that for any regular construction in geometry, *intuition* (in Kantian terms) is indispensable. Thus, there is an *indeterminacy* between the "top-down" structure of thinking that starts out strictly from the *cogito* and proceeds by *conceptual-abstract analysis*, and the "bottom-up" structure, still prevalent in the *Regulae* and the *Discourse*, where thinking starts out in a *direct visual-spatial-figurative* way from the geometric bodies and the objects of the outside world and proceeds by *intuition* and *deduction*. And this is precisely what brings us back to our main issue. What, in Descartes, is an indeterminacy between, or coexistence of, a *bottom-up* structure of thinking that starts out from the *simple natures* (intuitive evidence and deduction) and a *top-down* structure that starts out from the *cogito* can already be found in Plato, as Rudolf Arnheim has noted in the chapter "*Plato of two minds*" of his fascinating work "*Visual Thinking*":

"*In Plato's dialogues, an ambiguous attitude expresses itself in two quite different approaches, which coexist uneasily. He speaks of gazing upon truth that is the very being with which true knowledge is concerned: the colorless, formless, intangible essence, visible only to the mind, the pilot of the soul.*"[979]

So, there are obviously two faculties of thinking: an archaic-visual one that, by *intuitive evidence*, grasps the *simple natures* in the more elementary geometric figures and bodies and is able to apprehend their relations, and a much younger and much more powerful conceptual one that can think and assess complex connections. Descartes had quite appropriately and consistently ascertained these two faculties but (like virtually all those before and after him) found himself unable to give an adequate account of them and, therefore, chose to opt for the higher and more abstract top-down conceptual faculty as the ultimate anchoring point for the self-assertion of the mind. In his study on Leibniz, Cassirer deals with this parallel approach in Descartes by confronting the *Regulae* with the "*cogito ergo sum*" of the *Meditations*:

"*Paradoxical though it may seem, the critical merit of the idea is most evident in the Rules, that is, the very work from which the phrase itself in its famous formulation is absent. In fact, the introductory statement of the Rules where the unity of the intellect is posited as the starting point from which to derive the particular nature of objects*

[979] Rudolf Arnheim, Visual Thinking, Berkeley 1997, p. 6ff.

*already implies the essential worth of the 'cogito ergo sum' for the problem of pure cognition*."[980]

If, in strictly idealist terms, we start out from the self-assertion of the ego, "*the unity of the intellect*" – for when thinking, we always already are in thinking – this choice is justified and already foreshadows Kant. Still, if we want to "explore the entire range of the cognitive faculty," we must not ignore certain essential elements because otherwise, we will time and again be led into the delusions and confusions already described. Another point that irritates Cassirer (particularly in Rule XIV) is Descartes' strong commitment to visual thinking and his regrettable – from Cassirer's point of view – failure to proceed to a complete algebraization of geometry. For a follower of Cohen, this is, of course, an important point since, after all, it is the path that leads to Leibniz and, ultimately, infinitesimal calculus:

"*Thus, the starting point for Descartes' 'Geometry' is not the idea that all spatial structures should be reformulated in terms of equations – as could be expected, after all – but a geometric presentation and interpretation of the elementary arithmetic operations*." (loc. cit., p. 39)

So, the crucial points for us to clarify have become quite evident: we obviously need to re-examine the effective range of the visual elements of the cognitive process as set forth by Descartes in the *Regulae*, the *Discourse*, and, later, the *Meditations*. There is no denying that the starting point of Descartes' research is the logical method in geometry and mathematics.[981] Here, "*there are only two sources of certainty: intuition and deduction. Only what is immediately understandable, what is given in 'actual evidence,' or what can be deduced, in accord with strictly logical rules, from evident premises.*"[982] In the *Regulae*, this mode of *intuitive evidence*, i.e. the grasping of the *simple natures* by the *innate natural light*, is unambiguously illustrated by geometric examples and has a definite tendency towards visual thinking, even in cases where what is at issue is the gaining of insight, with "the eyes of the mind," into non-visual connections. But in the *Regulae*, there also are expressions such as "*formed … in the imagination*,"[983] "*the figure which* [*the external sense*] *receives*" (loc. cit., p. 41), or references to the ability to "*visually take in the intermediate links of a logi-*

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980 Ernst Cassirer, Leibniz' System in seinen wissenschaftlichen Grundlagen, Marburg 1902, p. 43.

981 Ernst Cassirer, Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit, Darmstadt 1995, Bd. I, p. 440f.

982 Ernst Cassirer, Descartes Lehre – Persönlichkeit – Wirkung, Hamburg (Meiner) 1995, p. 25.

983 René Descartes, René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 43.

*cal chain*" (loc. cit., Reg III, p. 15), or, last but not least, statements to the effect that "*the idea of that thing must be formed as distinctly as possible in the imagination*" (loc. cit., Reg XII, p. 43), while in the *Meditations*, Descartes says that "*some of my thoughts are as it were the images of things*,"[984] or are " *perceived by the mind alone*" (loc. cit., p. 25, 21).

However, in Descartes' later writings and in the *Principles*, things get more complicated as the *imagination* gains in importance while *intuition/deduction* and the *simple natures* lose their prominence. So, we need to clarify how and to what extent *visual thinking*, which is clearly, if implicitly, present in the *Regulae*, is still taken into account in the later writings, or downplayed in favor of cogito-anchored propositional thinking. Furthermore, we need to examine to what extent Descartes' criteria of truth – *clear* and *distinct* – which obviously stem from the realm of *visual thinking* become more abstract over time, and to determine the role of innate knowledge as the element that connects all these considerations which, after all, are basic for rationalism. This is a non-trivial task, and I propose to deal with it by drawing, first, on the *Regulae* and, in due course, on the *Meditations* and the *Principles of Philosophy*. In parallel, and as a creative "control program," I will consult Dennis L. Sepper's "*Descartes's Imagination*"[985] whose main focus is on the importance of the *imagination* in Descartes; and, as a "solid" platform, Dominik Perler's writings on Descartes, already repeatedly referred to. If my approach is valid, it should allow me to show that in Descartes' doctrine, just as in Plato's *Meno*, neither figurative approaches alone nor propositional reasoning alone suffice to account for the methodical functioning of the cognitive process and that, in the final analysis, there is only one explanation left that is both sufficient and plausible, namely the faculty of *visual thinking*. Which would imply that instead of being watered down, the rationalistic doctrine would gain in coherence and solid grounding. So, let's once more return to the *Regulae* and to the exposition of *intuitive evidence* and *deduction*, and the *simple natures* that are grasped by the *natural light*.

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984 René Descartes, René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 25.

985 Dennis L. Sepper, Descartes's Imagination: Proportion, Images, and the Activity of Thinking, University of California Press 1996.

## The renaissance of visual thinking in the philosophy of modernity in Descartes' "*Regulae ad directionem ingenii*"

In the above, we have already quoted Paul Natorp as the author who most specifically emphasized the fact "*that Descartes' position in the 'Rules' is the position of criticism thus defined, or at least very close to it, closer, at any rate, than any other work of modern philosophy before Kant.*" At the same time, Descartes' philosophy constitutes a definite break with the Aristotelian-scholastic philosophy of the Middle Ages and its syllogistic-linguistic logic. "*Syllogism compels but does not convince; whereas analysis lays open the internal structure of the problem and shows the origin of and the course taken by the discovery,*"[986] as Ernst Cassirer characterizes this process. Thus, the *Regulae* provide the interesting opportunity for us to observe, step by step, *in nuce*, the emergence of modern rationalism. Quite clearly, as evident in the very headings of the – unwritten – Rules XX and XXI that mainly refer to mathematical equations, but also already in Rule XVIII, analytical geometry is Descartes' starting point in the *Regulae*, that is, the process of problem-solving, with necessity and universality, in geometry and algebra. The *Regulae* further allow us to explore the question of what are the indispensable components, or elements or, better still, *functions* for the mind to ascertain and warrant, with the required certainty, the respective results; and, finally, what should be the cornerstones of a doctrine that warrants the *certainty of science* not only in the field of geometry but in knowledge in general and, thus, in our knowledge of the world.

In this, as we have already pointed out, it is the "bottom-up" procedure of geometric problem solving that enables Descartes, just as Plato before him, to ascertain operations that are "*natural*" and indispensable in the cognitive process. Dominik Perler, too, is aware of this tendency in Descartes' early writings, which he sees as a quasi-naturalistic project:

"*In fact, he seeks to explain cognitive processes in terms of a certain theory of perception as well as in terms of physiology. Actually, using an expression frequently found in the current debate (Quine 1969), this early project could be characterized as an attempt to devise a naturalized, or naturalistic, epistemology: naturalized, because cognitive processes are conceived of as natural processes that can be scientifically explained, rather than processes that need backing by evidence.*"[987]

Notwithstanding his decidedly scientific attitude and his study of the human body and the world in general ("*Le Monde*"), Descartes posits the *mind* as something "*completely different*" that is always already there when thinking sets in and is, at the same time, creative and non-predictable in

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[986] Ernst Cassirer, Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit, Band I, Darmstadt 1995 (1922), p. 449.

[987] Dominik Perler, René Descartes, Münchenn 2006, p. 127f.

terms of physical models. What we have here is a harmonious combination of *idealist rationalism* and *scientificity*, which from an EAN perspective may be unwonted but points clearly in the direction of Marburg Neo-Kantianism. Thus, in his *Optics*, Descartes studies the pathways of the optical nerves and, in addition, offers physical-anatomical drawings that are surprisingly exact for his time. From these studies, he concludes that the object and size constancy of things does not correlate with the calculation of the physical models as such (see the chapter on *vision science*), and the discrepancy thus discovered leads him to the further conclusion that, obviously, certain ongoing corrections must be made by the mind and that, as a consequence, and contrary to what some EAN proponents believe and propagate to the present day, there can be no such thing as a *direct copying* of objects. From this, in turn, he draws conclusions that will become relevant for the philosophical consequences of his epistemology: given the impossibility of "direct" copying, perception must always already be an adaptive activity of the mind and is, therefore, to be understood in terms of relations and proportions and certain encodings but never in terms of a "photographic plate" (Bertrand Russell) or *tabula rasa* (Locke). Thus, it is the *scientific approach* that leads Descartes to his philosophical conclusions about the function of the mind, and it is this correct approach of his rationalistic method that enables him to gain insight into the actual conditions of visual geometry.

So, following Descartes' *epistemology* in the *Regulae*, these are the constitutive elements that play a role in a meaningful account of visual thinking:

1. The *senses* (including the physical and optical processes studied in detail in the *Optics*, in accordance with the state of the sciences in the 17th century), that obviously enable us to perceive the objects of the external world and are the indispensable basis of the cognitive process although they can, at the same time, always be misleading.
2. The *imagination*, where we can to a certain extent reproduce the things of the external world to retain them in memory but also deliberately represent objects or construct geometric figures.
3. The *natural light*, that is, the *understanding*, which can be described in accord with certain rules (or later, in Kant, categories) containing the "*natural seeds*" of reason.
4. The simple fact that the *natural light* must be *innate*, that is, that our mind must dispositionally have innate structures which are universal and necessary.
5. *Intuitive evidence*, which is characterized by the *clear* and *distinct insight* into elementary relations and, given an attentive mind, is gained *all at once*, that is, in a single act, with no error possible.

6. The *simple natures*, are those simplest and most elementary relations, or functional connections, that the *intuition* clearly and distinctly grasps in one act, "*all at once*."
7. *Deduction*, conceived of as the procedure by which the *simple natures* grasped by *intuitive evidence* are step by step connected into *logical chains*.

In a next step, Descartes, in addition, provides the natural predispositions discovered, or re-discovered, by him with certain procedures he developed, i.e. the directions and the method designed to make sure that scientific reasoning and research lead to correct and meaningful findings. These are:

1. The principle of *radical doubt*, that is, the refusal to accept anything as true that has been passed on unverified and cannot be *clearly* and *distinctly* explained. In the thought experiment of the *Meditations*, this principle finds its extreme expression in the "evil demon" that can actively and maliciously produce this type of fallacies. Doubt is the "instrument" cleaning our mind from prejudices and idols.
2. The *analytical method*, which is based on the procedure of geometric proof in ancient Greece. In contrast to the synthetic method, it is a heuristic procedure for solving concrete problems and, as a method, a more adequate means of gaining *new* knowledge. "*Descartes emphasizes that the analytical method should always be employed when one seeks to gain new knowledge*."[988] Geometric analysis in conjunction with the new algebraic method, then, leads to *universal mathesis* "*which, irrespective of definite objects, be they numbers, figures, heavenly bodies, or tones, includes everything that relates to order and measure*."[989]
3. The four rules of the *method* as set forth in the *Discourse*, previously discussed.
4. The concept of the *order of things* and the *order of reasons*, previously discussed.

From a neo-Kantian perspective, the methods are still a mere outline, drawn from the practice of geometry rather than logically and methodically deduced, let alone architectonically organized into a logical system as in Kant. But let's not forget that at this point, i.e. one hundred and fifty years before Kant, all these first important insights and approaches were quite recent discoveries, made as a result of geometric-mathematical reasoning. Indeed, Descartes will later resume his reflections on them and

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988 Dominik Perler, René Descartes, München 2006, p. 63.

989 Paul Natorp, Descartes' Erkenntnistheorie, Eine Studie zur Vorgeschichte des Kriticismus, Marburg 1882, p. 22.

come to the conclusion that "… *thought … alone is inseparable from me. I am, I exist – that is certain*," which, in turn, means that he laid the groundwork for modern philosophy and, thus, also for Kant. Of course, the entire structure of categories, ideas, and transcendental dialectics is also still far away, but this does not detract from the fact that within the realms of possibility prevalent at the time, Descartes sought to establish a foundation for the sciences. As for providing evidence of *visual thinking* in Descartes' doctrine, this level of reflection is quite sufficient. Doing the same for Kant will be far more difficult and complicated. So, let's use the above-listed elements of Descartes' epistemology to further uncover the traces of visual thinking.

## The senses in Descartes

In the *Regulae*, Descartes mentions *four* essential elements of any knowledge: the *senses*, the *imagination*, *memory*, and the *understanding*. So, let's start with the senses. Descartes' *Optics*, as previously quoted, opens with the following introductory statement:

"*The conduct of our life depends entirely on our senses, and since sight is the noblest and most comprehensive of the senses, inventions which serve to increase its power are undoubtedly among the most useful there can be.*"[990]

This is as far as you can get from the alleged devaluation of sensory perception per se in *rationalism* where, on the contrary, and as this passage clearly shows, it is highly appreciated. But we are also familiar with Descartes' famous method of *doubt* whose function it is to warrant the certainty of scientific progress, so the obligatory next step is to reconsider the efficiency and reliability of these *senses*. And here, in turn, the fact that Descartes never glosses over the skeptical objections that keep lurking in the background comes into effect. Thus, in the *Meditations*, he notes that in spite of the high appreciation of sensory perceptions, he has become disillusioned with their reliability:

"*Later on, however, I had many experiences which gradually undermined all the faith I had had in the senses. Sometimes towers which had looked round from a distance appeared square from close up;*[991] *and enormous statues standing on their pediments did not seem large when observed from the ground. In these and countless other such*

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990 René Descartes, Optics, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 152.

991 The well-known example of the towers shows Descartes' permanent awareness of the arguments of the sceptics, see: Sextus Empiricus, *Outlines of Scepticism*, Cambridge University Press 2000.

*cases, I found that the judgements of the external senses were mistaken. And this applied not just to the external senses but to the internal senses as well.*"[992]

This consideration from the *Meditations* is important for Descartes' epistemic understanding of sensory perception. As a basis of information about the outside world, it is indispensable and of the highest value, but it can also be misleading, which is even worse than being incorrect, for being led astray, every now and then, by a source of information one used to trust is much more disillusioning. Thus, it is deemed unreliable, and unfit as an unshakeable foundation of knowledge. In the *Regulae*, Descartes first refers to a concept of perception that is almost empiricist in nature, namely by resorting to the metaphor, current in ancient Greek philosophy, of the impression of a seal on wax, that is, the passive imprint of objects that is occasioned by a motion of the senses.[993] But this is only one aspect of perception. Descartes at once specifies that colors, for instance, cannot be taken in by the brain such as they appear to the senses and that each color could be symbolized – encoded as it were – by a figure. Dominik Perler describes this process as follows:

"*Thus, an 'image' that the brain forms of a perceived object is nothing other than a complex code composed by the codes for each of its perceived properties. When the soul directly looks at the 'images,' as Descartes says, this simply means that it is deciphering these codes.*"[994]

So much for the mechanism of "internal images," insistently imputed to Descartes by EAN proponents (cf. D.C. Dennett's, a follower of Ryle's, alleged "*Cartesian theater*") but incorrect in terms of his doctrine and frequently and clearly refuted by him. But Descartes now also specifies (and this will be discussed in more detail below) that to enable perception, the seemingly *passive* component is, at the level of the imagination, supplemented by an *active* component:

"*In all these functions the cognitive power is sometimes passive, sometimes active; sometimes resembling the seal, sometimes the wax. But this should be understood merely as an analogy, … it is one and the same power: when applying itself along with imagination to the 'common' sense, it is said to see, touch etc.; …*"[995]

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992 René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 53.

993 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 40.

994 Dominik Perler, René Descartes, München 2006, p. 134.

995 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 42.

This needs mentioning here to ward off the erroneous impression that Descartes wrongly assumed passive copying as a cognitive mode, and show that, on the contrary, this cognition is an active process enabled by *one and the same power*, with the emphasis being on *one and the same*. Also, in contrast to Locke and Hume, Descartes, as previously quoted, reflects on the fact that the *things in themselves* may indeed be quite different from what they appear to us:

"*They may not at all exist in the way that exactly corresponds with my sensory grasp of them, for in many cases the grasp of the senses is very obscure and confused. But at least they possess all the properties which I clearly and distinctly understand, …*"[996]

A last important point in Descartes' assessment of the senses with respect to the certainty they warrant (and not as an initial "source of information") is his conviction that the senses, far from being themselves the cause of fallacy, simply do what they must in accord with the role bestowed on them by nature. The fallacy, then, is of our own making, and a result of the mistakes we make when proceeding to judgments *based on* these sense data. It is only by *clear and distinct* thinking that we can correctly understand them. Dominik Perler very lucidly describes the structure of this argument:

"*Descartes, however, opposes the idea of self-correction by the senses:*

*'But the sense alone does not suffice to correct the visual error: in addition we need to have some degree of reason which tells us that in this case we should believe the judgement based on touch rather that that elicited by vision. And since we did not have this power of reasoning in our infancy, it must be attributed not to the senses but to the intellect. Thus even in the very example my critics produce, it is the intellect alone which corrects the error of the senses; …'*

*This very concise passage makes it sufficiently clear that Descartes' appeal to the intellect as the supervisory authority is not due to any disregard of the senses (as the occasional imputation will have it). Rather, his rationalistic position is motivated by the need to find an independent criterion of truth. Trying to correct an information provided by one sense by referring to another information of that same sense, or to information provided by other senses, means that one keeps appealing to one and the same authority. It is like someone seeking to verify the truth of what he reads in the paper – to refer to a metaphor used by Wittgenstein – by buying several copies of one and the same newspaper, or different newspapers from one and the same publishing company. He simply puts the controlling authority on a level with the authority to be controlled. But this, of course, is inadmissible, which is precisely why Descartes invokes the intellect as an independent authority.*"[997]

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[996] René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 55.

[997] Dominik Perler, Repräsentation bei Descartes, Frankfurt / Main 1996, p. 200f.; Descartes' argument is from the Sixth Set of Replies (to the Sixth Set of Objec-

With this, we have once again gained an important insight, namely that the "senses" really play an almost naturalistic role in Descartes, providing what they must in accord with the function bestowed on them by nature, while the understanding alone can determine – *clearly* and *distinctly* differentiate – what is true knowledge. This is what Perler makes admirably clear. What is more, Perler also invalidates the usual charge raised against Descartes, i.e. his alleged disregard of the senses for reasons of ideology, by showing that these reasons obviously follow from the logic of the system. Having thus clarified the position of the senses in Descartes, we can now check them off as a possible source of *visual thinking*, this is not where we will find it. For Descartes, sensory perception obviously has the function of a potentially unreliable "source of information," with no parts of it pertaining to the understanding. S.V. Keeling succinctly characterizes the role of the senses in Descartes as follows: "*Sense experience, then, has no direct epistemological value. Its value is, in a wider sense, utilitarian and biological*."[998] This being established, we can now leave behind the senses as a primal source of insight and turn to the role of the *imagination* in Descartes.

## The imagination in Descartes

We are now approaching a rather fluid and not very well-defined domain in Descartes' doctrine, whose meaning as well as the position in the architectonic of rationalism and the description of its capacity tend to change over time and with the development of Descartes' reasoning from the *Regulae* to the *Discourse* to the *Meditations* and, finally, the *Principles of Philosophy*. In an interesting parallelism, the need to bring the *intuitions* under the *concepts of the understanding*, that is, the description of imagination and synthesis is also one of the most difficult and most "obscure" issues in the architectonic of Kant's *Critique of Pure Reason*. For in Kant, the mutual transformation of these seemingly incompatible domains has to be accomplished by a *third* function, i.e. *productive imagination* and *schematism*, which, in Kant's famous definition, is a "*hidden art in the depths of the human soul, whose true operations we can divine from nature and lay unveiled before our eyes only with difficulty*" (CPR, B 180/181). Descartes' reasoning is no less tentative in this respect. In addition, interpretations differ among his many commentators. Thus, Dennis L. Sepper argues:

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tions to his *Meditations*, loc. cit., p. 296); Wittgenstein's metaphor is from: Philosophical Investigations, Part I, § 265).

998 S.V. Keeling, Descartes, Oxford University Press, London 1934, p. 163.

"*The* Regulae ad directionem ingenii *(…) is the best-known work presenting a positive understanding of imagination; imagination is discussed throughout, and the second part expressly develops a cognitive method of employing imagination to solve problems.*"[999]

There is no doubt that Sepper's description of how the faculty of *imagination* is conceived of in Descartes' work is as comprehensive as it is exact. And it is also true that the *imagination*, that is, the faculty that enables us to mentally represent figures – primarily geometric ones – plays a crucial role in the *Regulae* and is increasingly applied to the purposes of the understanding. Nevertheless, I will strictly distinguish between those passages and arguments in Descartes that are concerned with *visual thinking* – that is, the *intuitive evidence* that enables us to *grasp*, in a single act, elementary functional connections such as, for instance, that a triangle has three corners or that a sphere has only one surface, or to imagine and even "turn and rotate" a geometric figure with the "eyes of the mind" and, thus, find the solution to a problem – and those passages and arguments that are about the "*painting*" and representation of images in the imagination. If turning and rotating the geometric object enables us to suddenly "see" the solution to a problem, this is an *act of insight* and of the *understanding* that is nothing to do with images or representations. After all, I might turn and rotate a marshmallow in my imagination for hours on end, having it change color from white to rose and back again, yet this would not qualify as an act that results in an increase in knowledge. Nevertheless, the extent to which Descartes links cognition to the perception of geometric objects and even abstract concepts and numbers, thus clearly anticipating Kant's schematism, remains an issue that needs clarifying!

But let's first see how Descartes himself positions the concept of *imagination*. At first, in the *Third Meditation*, he says "*that the ideas in me are like images which can easily fall short of the perfection of the things from which they are taken, but which cannot contain anything greater or more perfect.*"[1000] Thus, he is clearly aware that the imagination can represent ideas in the form of "*images*" (which implies that ideas are not mere propositions) which, however, and in contrast to Hume, fall short of the perfection of the things in themselves and are *not* an "*exact*" copy. However, at this point, he is still somewhat vague. But in the *Sixth Meditation* which is also the last one in this great *thought experiment* – and the very context where the rather tentative reasoning of the preceding *Meditations* gets more and more concrete – he is more specific:

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[999] Dennis L. Sepper, Descartes Imagination, University of California Press, Berkeley Los Angeles 1996, p. 4.

[1000] René Descartes, Meditations on First Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 2, Cambridge University Press 1985, p. 29.

"*To make this clear, I will first examine the difference between imagination and pure understanding. When I imagine a triangle, for example, I do not merely understand that it is a figure bounded by three lines, but at the same time I also see the three lines with my mind's eye as if they were present before me; and this is what I call imagining.*" (loc. cit., p. 50)

This is a very enlightening statement, and of great value insofar as it offers some important clarifications. First, Descartes distinguishes between *imagination* and *pure understanding*, which correlates remarkably well with Kant's ordering of imagination and understanding in the *Critique of Pure Reason*. Next, he says that he imagines a triangle in a more general way, that is, as a figure with three sides, which is consistent with, both, *Stephen Kosslyn*'s – previously discussed – "*mental imagery*" and his description of "*scanning*," i.e. the contemplation of the three sides of the triangle with "*the mind's eyes*," as well as with Plato's seeing with the "eyes of the mind." Also, the triangle in Descartes's imagination is rather unspecific – "*a figure bounded by three lines*" –, which suggests that it is a more *general representation* of a triangle, in contrast to Hume's and Berkeley's impossible doctrine that we can always only imagine a *concrete individual* triangle, a tenet which, as we have seen, was refuted by Bertrand Russell himself. At the same time, Descartes definitely clarifies his conception of "*imagining something*," namely as a process which we would today describe as imagining an object. But he is also aware of another type of "images" in his imagination, namely those he understands to be phantasms:

"*Some of my thoughts are as it were the images of things, and it is only in these cases that the term 'idea' is strictly appropriate – for example when I think of a man, or a chimera, or the sky, or an angel, or God. (…) Now as far as ideas are concerned, …, they cannot strictly speaking be false; for whether it is a goat or a chimera that I am imagining, it is just as true that I imagine the former as the latter.*" (loc. cit., III, p. 25f.)

Thus, the images in the *imagination* can obviously be those of a chimera, an angel, and even God (where, as a rationalist, I'd be curious to know what this image might look like, but let's leave it at that). At any rate, it has become relatively clear what Descartes understands by "imagining" – which may concern objects and geometric figures, on the one hand, but also pure phantasms, on the other – and that for him, the imagination is "*clearly distinct*" from the understanding even though it seems to be an irreplaceable medium term that makes it possible for the understanding to "access" the concrete bodies and figures, in the first place. Thus, the *imagination* is what could be described as a mediating faculty, an "enabler" of pure reason. Dennis Sepper takes a similar view:

"*As the examination of the piece of wax shows, the knowledge of things belongs not to sensation or imagination but to the inspection of mind (inspectio mentis AT VII 30–*

*32). Imagination can produce appearances, but this power is never definitive. Although everyone can picture, that is, produce in imagination a triangle, a thousand-sided figure is beyond the human being's imaginative powers; for the understanding however, the chiliagon is no less clearly and distinctly conceived than a triangle (AT VII 72).*"[1001]

This well-known passage of the *Meditations* refers to the fact that the imagination, just as every other human faculty, has a certain *capacity* that suffices for us to imagine a pentagon, for instance, but may already be overtaxed when we try to imagine a decagon. What comes to mind, at this point, are those evolutionarily developed structures and faculties which come into play – and have been discussed by us – in the context of "subitizing," i.e. the direct recognition of small sets. The human imagination has precisely that innate capacity, or "range," that suffices for simple human beings on earth to intuitively grasp numbers in the range from *one* to *three* or, at most, *four*, while due to the development of the imagination from vision and to the effect of saccadic eye movement, representations in the imagination – the "eyes of the mind" – cannot be "retained" for more than *a few seconds*. These are the natural bases of imagining and, as such, important concrete facts which "*from the human standpoint*" must not be ignored but, rather, accounted for in the philosophical debate.

Regarding the matter under investigation, namely of whether there is *visual thinking* in Descartes, I'll now once more turn to the *Regulae* because this is where the imagination is increasingly applied to the purposes of the understanding. This is remarkable insofar as from the A to the B edition of Kant's *Critique of Pure Reason*, there is a similar shift of the *imagination* from the domain of *sensibility* to that of the *understanding*. Thus, both philosophers seem to be on more or less diffuse ground when dealing with the relation between imagination and understanding, and keep developing its contours! In Descartes' *Regulae* this means that there is his basic assumption of a spontaneous self-consciousness, on the one hand, but a chain of reasoning that is primarily made plausible by geometric examples, and a reliance on expressions that suggest a *visual* process whenever he discusses what is clearly an understanding of connections *per se*, on the other. He starts by stating that the senses may stimulate the imagination "*by depicting the images of bodies upon it*."[1002] When, however, "*the intellect proposes to examine something which can be referred to the body*," that is, a real, or geometric, object, "*the idea of that object must be formed as distinctly as possible in the imagination*" (loc. cit.). This suggests,

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[1001] Dennis L. Sepper, Descartes Imagination, University of California Press, Berkeley Los Angeles 1996, p. 3.

[1002] René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 43.

as Kosslyn notes, that Descartes is familiar with the construction of a geometric figure in the imagination, which, in turn, calls to mind Kant's *pure construction* in the imagination. L.J. Beck contrasts the *imagination*, that is, the representation of geometric figures or objects by the power of imagination, with the activity of the mind as described by Descartes in the *Regulae*. Beck captures this activity by terms such as "*intellectual intuition*" or "*intellectual 'seeing'*" which, incidentally, cannot deny their origin in the visual domain. *Intuitive evidence*, as previously explained, is the activity of the pure, innate understanding. Beck describes the relation between innate understanding and imagination as follows:

"*Descartes explicitly declares in Rule 12 that 'the intellect can be stimulated by the imagination or, on the contrary, the intellect can act on the imagination.' There can therefore be, for instance, an action of the intellect on the imagination when we fix our attention on images already formed or when we form new images.*"[1003]

Thus, it is made quite clear that the *imagination* is more than a mere "drawing board," it also has the capacity of *fantasy* as a potential means of stimulating the intellect while, inversely, the intellect can rework and modify the images formed by the imagination. This emphasis on the active role of the imagination also in terms of fantasy distinguishes Descartes in some way from most EAN authors since the latter are primarily concerned with demarcating the representation of the "winged horse" or the "unicorn" from reality and knowledge. Due to their "obsession" with the world of real things, however, they tend to ignore the creative-heuristic worth of fantasy, for without the phantasms of winged horses or winged chariots, Leonardo da Vinci, for instance, might not have found it that easy to design a flying device. Beck then addresses the major role of the *imagination* in the context of the mathematization of cognition in Descartes' *Regulae*, stating

"*…that at a certain level of mathematical thinking, the use of the imagination is of great value and even sometimes necessary. (…) Rule 14, moreover, deals at some length with the use which can be made of imagination by intellect and we are told how we can 'use our imagination, employing not pure intellect, but the intellect as aided by the images depicted in the imagination.'*" (loc. cit., p. 54)

This further clarifies the role of the *imagination*: it "*is of great value and even sometimes necessary*" for mathematical thinking while, at the same time, the intellect can draw on these images and representations for its activity. Beck then further elaborates on Descartes' reasoning:

"*By the use of figures, pictorial representations, the mathematicians might exhibit to us 'a great number of truths and conclusions drawn from certain consequences. But they do not seem to make it sufficiently plain to the mind itself why these things were so*

[1003] L.J. Beck, The Method of Descartes, The Clarendon Press, Oxford 1952, p. 53.

*and how they had discovered them (Rule 4 AT X 375)'. For in themselves images have not their own guarantee of truth, their own evidence, and they cannot therefore give to the mind that absolute certainty and assurance which are the* sine qua non *of true knowledge and are the characteristics of intellectual intuition.*" (loc. cit., p. 54)

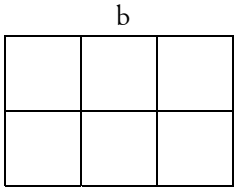
This very aptly describes the role and function of the imagination in Descartes. It can represent real objects as well as phantasms, it can, due to its figurative operations, *assist* the intellect in geometric or technical problem-solving, and it is virtually indispensable for many artisanal tasks. But – and this is the crucial point stressed by Beck – because "… *in themselves images have not their own guarantee of truth, their own evidence, and they cannot therefore give to the mind that absolute certainty and assurance which are the* sine qua non *of true knowledge and are the characteristics of intellectual intuition*," one can imagine lots of things, but the intellect alone can warrant the certainty of knowledge! This means that the entire process of drawing conclusions from the images, or figurative arrangements, that are seen "with the eyes of the mind," as well as of warranting the universality and necessity of the things thus "seen" remains the domain of the understanding alone, of the intellect which gains insights and, then, makes judgments about and draws conclusions from the things imagined. On the other hand, the importance of the imagination should not be underestimated, for without our ability to imagine the various options for the solution of a geometric or practical problem, the intellect, however logically flawless in its approach, could never "see" the correct solution. Thus, *visual thinking* obviously rests on the combined powers of figurative imagination – and, to a certain degree, fantasy – and the understanding which *clearly* and *distinctly* and *all at once* realizes what is logical and right or "the solution." Dennis Sepper moreover notes that the *imagination* plays a similarly important role already in the act of grasping an object "*in the presence of the object*," not only in terms of pure construction or when playing with representations but also in the sense of Kant's reproductive imagination:

"*Imagination is therefore not construed here as the act of originally representing the object as object to perception, but rather as a way of (re)constructing or (re)grasping that object in the presence of the object, which is either direct presence (sensed) or remembered presence.*"[1004]

Proceeding with the *Regulae*, Sepper – under the heading "*Ingenium and Figuration*" – then discusses the examples offered by Descartes. It is, indeed, quite obvious that with every new Rule, Descartes increasingly uses diagrams, figures, schemata, and even numbers rather than concepts because the schema is superior to conceptual descriptions insofar as it allows

[1004] Dennis L. Sepper, Descartes Imagination, University of California Press, Berkeley Los Angeles 1996, p. 51.

for a more adequate and more concise representation of *relations*, and in particular relations of magnitude[1005] – which is what Descartes is concerned with in view of *analytical geometry* and *mathesis universalis* –, but even conceptual connections. Descartes' representation of the number three by three dots is particularly impressive in this context since it already foreshadows Kant's use of five dots to represent the number 5 in the respective chapter of the *Critique of Pure Reason* (loc. cit., p. 64; CPR, B 179). Another example is the family tree where Descartes uses an easy-to-understand diagram to represent the genealogical relationships (loc. cit., p. 64). Finally, in Rule XV, Descartes begins to correlate, and convert into one another, numbers, algebraic denotations, and figures until, in Rule XVIII, he represents a simple multiplication – *a* by *b* – in a way that indeed resembles Wittgenstein's demonstration of multiplication, presented in the Introduction of the present study.[1006] Unsurprisingly, the result also resembles Wittgenstein's schema:




(loc. cit., XVIII, p. 74)

Descartes now successively extends this procedure to all basic arithmetic operations, thus representing them *visually* and developing an early form of "*diagrammatic reasoning.*" Rules IXX to XXI, however, remain mere headlines referring to certain mathematical procedures never to be set forth. Now, why did Descartes cease to pursue this research that allowed him to so ingeniously establish a number of decisive anchor points for thinking and philosophy, what kept him from finishing and publishing the *Regulae*? Dennis Sepper offers a rather plausible explanation: having first used diagrams and figures to represent mathematical proportions, a topic of intense interest to him from the very start, i.e. his first scientific study on musical harmonies, Descartes realized that there was an easier and more efficient way of representation, namely by algebraic means, i.e. symbols. And his subsequent creation of analytical geometry provided him with the very tools that allowed for a clear and distinct representation of

[1005] René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, XIV, p. 58.

[1006] Ludwig Wittgenstein, Remarks on the Foundations of Mathematics, Oxford 1978, IV, §17, p. 233.

geometric proportions.[1007] All this may indeed have caused the visual-figurative "approach" to be pushed into the background, notwithstanding its dominant presence in the *Regulae*. Thus, the headline of Rule XV, for example, reads: "*It is generally helpful if we draw these figures and display them before our external senses. In this way it will be easier for us to keep our mind aler*t." And the headline of Rule XIV virtually brings the imagination and the visual procedures level to conceptual reasoning:

"*We must carefully note the following point with respect to all other propositions in which these terms retain the same meaning and are used in abstraction from subjects … we can and should employ the terms with the help of the imagination. For, even if the intellect attends solely and precisely to what the word denotes, the imagination nonetheless ought to form a real idea of the thing, so that the intellect, when required, can be directed towards the other features of the thing which are not conveyed by the term in question, and so that it may never injudiciously take these features to be excluded.*"[1008]

This passage is absolutely remarkable, if rarely quoted. For although it is about proportions and mathematical objects, and although Descartes states that we express ourselves by propositions and that "*the intellect attends solely and precisely to what the word denotes*," he also says that we should not disregard the figurative imagination even when dealing with *abstract connections* since it keeps us from overlooking or ignoring those features that are not expressed, or cannot be expressed, by words! And yet, having formulated just a few more Rules, Descartes ceases to discuss the visual element and discontinues working on the *Regulae*. In my view, the reason could have been as follows: we have already noted that in the last Rules, Descartes makes increasingly use of algebraic representations which are not only easier to handle as well as more elegant than graphical representations but are also *clear* and *distinct*. Given the powerful functionality of algebraic representations, he may have realized that while his grounding of thinking *per se* in *intuitive evidence*, in the *simple natures*, in *intuition* and *deduction*, is easy to understand as well as correct, the *visual domain* is insufficient when it comes to expressing and warranting the *certainty* of thinking at a purely abstract, conceptual level! Therefore, he felt the need to conceive of a more radical and more comprehensive anchoring of self-assurance, namely in the self-conscious ego, which in due course became the main concern of the *Meditations*.

So, having explored the role of the *imagination* in Descartes as far as it serves the purpose of this study, we can state the following with respect

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1007 Dennis L. Sepper, Descartes Imagination, University of California Press, Berkeley Los Angeles 1996, p. 108.

1008 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, XIV, p. 61.

to both the affordances and the constraints of *visual thinking*: in the *imagination*, we can interpretively construct the imagined *real objects* as well as such figures as are entirely imagined; we can, then – within the limits of time (a few seconds) and capacity (pentagon vs. chiliagon) imposed on the imagination by evolution – imagine geometric objects, or bodies, and "work on" them, that is, turn, rotate, and construct them in the three-dimensional space that is the *innate* space of our imagination. This capacity of the imagination is the unalterable condition for us to be able to solve non-conceptual problems and engage in practical action. However, *visual thinking* obviously also *depends* on this faculty, it couldn't operate *without* it; which further implies that the *imagination* must be an essential element of *visual thinking*, lacking which all these geometric operations could not be carried out at all. On the other hand, the capacity of the imagination alone is far too limited to allow for judgments to be made and conclusions to be drawn even at the preconceptual level. Again, at the upper limits of what the imagination is capable of accomplishing, we are confronted with the need for a form of thinking that is not yet conceptual but already more than mere imagining. Both faculties need to blend into each other to make *visual thinking* possible!

## *Intuitive evidence* and *simple natures* – first indications of visual thinking in Descartes

Before turning to the most rewarding – with respect to the present topic – elements of Descartes' innovative epistemology, let's briefly call to mind a number of statements from the *Regulae* that show the profound interest Descartes took in visual aspects in the course of his geometry-inspired reflection. We have already quoted him as saying that even contents that are captured by propositions should be supplemented by figurative representations to provide thinking with the broadest possible description of the sought-for connection. Even in *deduction*, that is, deductive reasoning, or reasoning by synthesizing intuitively grasped connections, visual metaphors or methods come into play. In the *Regulae*, the headings alone offer statements such as: Rule III "… *what we can clearly and evidently intuit or deduce with certainty*" – and it should be kept in mind that this Rule is about *general* thought processes and not about diagrams. Taken literally, this would imply that we actually *see* simple fundamental truths before we begin to deduce them. Or take Rule IV: "*The whole method consists entirely in the ordering and arranging of the objects on which we must concentrate our mind's eye if we are to discover some truth*." Here, Descartes not only refers to the "mind's eye" just as Plato did before him, the formulation "*on which we must concentrate our mind's eye*" definitely suggests that a real act of visual contemplation is actually involved. Then,

Rule VII: "*In order to make our knowledge complete, every single thing relating to our undertaking must be surveyed in a continuous and wholly uninterrupted sweep of thought, and be included in a sufficient and well-ordered enumeration*."

Here, while he clearly refers to a movement of thought, he also states that things must be "*surveyed*," which at least suggests some kind of visual-mental "going through" and one-by-one inspection of these things before organizing them into "*a sufficient and well-ordered enumeration*." And this list, or enumeration, again makes one think of an actual visual survey of the respective items, which certainly differs from the way the flow of abstract propositions would be represented in the imagination! Also in Rule VII, Descartes again argues: "*In the same way, our eyes cannot distinguish at one glance all the links in a very long chain; but, if we have seen the connections between each link and its neighbor, this enables us to say that we have seen how the last link is connected with the first*."[1009] This again suggests that since we are unable to grasp the whole chain "*at one glance*," we "*see*" the individual links between the thoughts! The impression we get is that Descartes was actually trying to report on the thought processes he observed in himself in the concrete process of dealing with an equation. There is no doubt that the *Regulae* are more or less unique in the history of philosophy, as Dennis Sepper has so clearly seen and demonstrated, for there is hardly any other work where so many verbs denoting *visual* activities are used to express genuine thought processes. One can't help feeling that for Descartes, *seeing* is more or less the model for the mental act of gaining insight, the *inspectio mentis*, which is particularly evident in those passages that deal with the definition of "*clear*" and "*distinct*" as the criteria of truth, since both terms are taken from the visual domain!

But let's now turn to *intuitive evidence*, *intuition*, and the *simple natures* associated with it. Before once more briefly going into Descartes' definition of *intuition* in the *Regulae*, I'd like to call to mind a basic fact that is absolutely essential for an adequate understanding of *intuition* in Descartes. As S.V. Keeling has cogently shown – and as we, too, have argued in the introductory chapters –, one cannot understand the way the cognitive process is conceived of in the *Regulae*, and actually in all of Descartes, unless one assumes the actual existence of *innate knowledge* and *innate ideas* in terms of *dispositionally* inherent mental structures. If one doesn't and, instead, takes *sense experience* and *tabula rasa* as the basis of one's interpretation and, moreover, relies on the instruments of analytical philosophy, Descartes' reasoning remains elusive; which is why most of the respective commentaries written in the second half of the 20th century

[1009] René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, VII, p. 26.

are not very helpful if not, for some of them, misleading. As a matter of principle, it is therefore absolutely necessary to always keep in mind Descartes' strategy, for it is only then that most of the unclear if not, in part, contradictory passages can be clarified. Furthermore, the terminology and the *way* in which Descartes considers a problem tend to vary, which also doesn't really help with understanding certain passages.

This is the reason why I'd first like to make sure that the cognitive process set forth by Descartes in the *Regulae* is unambiguously and clearly understood before, in a second step, engaging in the discussion of how to differentiate intuition from conceptual-discursive thinking and whether it is not actually *visual thinking*. In this, my argumentation will proceed inversely from that of the *Meno* chapter. In the latter, my aim was to differentiate *visual thinking* from "*seeing*" and "*seeing as …*," namely as a *sudden act of rational insight* where knowledge is gained that is new as well as correct and, therefore, more than mere "*seeing as…*" since the latter merely suggests an automatism where seeing flip-flops between two images we already know. My aim now is to show that *intuitive evidence*, or *intuition*, which, in Descartes, is the *most elementary mental operation* of gaining insight does not happen in the habitual way of conceptual thinking which, by definition, is a continuous movement of thought in terms of *concept*, *judgment*, and *conclusion*! *Intuition*, in contrast, means that the correct solution to a problem is found in a single act, *all at once*, not unlike what happens in the aha effect, previously described and discussed. Here, the actual presence of the visual element goes without saying because it is already implied by the very term of *intuition* and by Descartes' many visual metaphors and comments, as well as by its close link to the imagination which obviously operates in a figurative mode. In addition, there is the key role of *geometry* in the *Regulae*, whose classical Euclidean form was strongly marked by figurative thinking and, at the same time, provided the prototype of the step-by-step proof that warrants certainty.

So, let's first consider Descartes' definition of the concept of *intuition* and the way this *intuitive evidence* is logically linked to the concept of *simple natures*. In this, I will deliberately leave aside the concept of *deduction* which, in the *Regulae*, is introduced along with the concept of *intuition*, with the result that most commentators discuss both of them in one go. My reason for leaving it aside is that Descartes describes *deduction* as a procedure where the intuitions that have been "*admitted as certain*" are conceived of as "*links in a long chain*" that "*must be surveyed*" to enable us to understand how these links are logically connected in the structure of the chain and, then, to draw the right conclusions. The way this procedure is carried out differs from intuition by the mere fact that it is a "*continu-*

*ous movement*" in time and, in addition, requires some contribution from "*memory*."[1010]

*Intuition*, in contrast, as defined by Descartes at various points in the *Regulae*, is the "*clear and attentive mind*" that grasps the truth "*by means of a single and distinct act which is similar in every case*"[1011] as well as "*easy and distinct*,"[1012] and relies on the "*light of reason*" to "*at one glance*"[1013] "*form a distinct and, as far as possible, simultaneous conception*"[1014] so "*that there can be no room for doubt*."[1015] While deduction is obviously a step-by-step discursive procedure in time, *intuitive evidence* clearly is a "*single and distinct act which is similar in every case*" by which insight is gained all at once, at one glance, as a whole.

Dominik Perler highlights *three* crucial aspects of Descartes' definition of *intuition*. Firstly, it is an activity of the "*pure intellect*," a "*seeing with the eyes of the mind*" which, it is true, is directed towards the things of the real world but, *in* them, grasps those intelligible objects that are accessible only to the *intellectus purus*. Secondly, it is not a psychological process but a cognitive mode that leaves no room for doubt and, as such, implies a priori certainty. Below, we will try to concretize and clarify this aspect by exploring the *simple natures* which, being logically defined as the basic elements of cognition, are to be understood as constitutive of the system rather than a factor that is subject to psychological variations. And, as Perler further emphasizes, intuition happens "*in a single moment*," a "*single act*;"[1016] which, in the context of the present study, is its most important aspect. Thirdly, Perler makes it clear that "*intuition is a 'distinct grasping' of the mind, i.e. a mental activity that breaks down complex connections and starts with what can be grasped separately from everything else*" (loc. cit., p. 55); which is another very important point and leads directly on to the *simple natures*.

In Rule VI, then, the *simple natures* are at last introduced, namely in the context of the *method* conceived in the *Regulae* (and subsequently elaborated point by point in the *Discourse*), namely by stating that one

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1010 All quotes from René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, VII, p. 25.

1011 loc. cit., IX, p. 33.

1012 loc. cit., III, p. 14.

1013 loc. cit., VII, p. 26.

1014 loc. cit., XI, p. 37.

1015 loc. cit., III, p. 14.

1016 Dominik Perler, René Descartes, München 2006, p. 53f.

should always start out from "*what is simple in the highest degree*."[1017] But something can be "*simple*" only in relation to the cognizing mind since as an object of the senses, there is no such thing as "*simple*." Therefore, *in the very process of cognizing*, the *simple nature*, true to its name, needs to isolate or track down those elements which, in keeping with the structure of the *natural light* (!), cannot be more elementary. The absolute simplicity of the relations which we can think of, in the process of determining them, as associated *with* the imagined things tells the mind that the "bottom limit" has been reached:

"*I call 'absolute' whatever has within it the pure and simple nature in question; that is, whatever is viewed as being independent, a cause, simple, universal, single, equal, similar, straight, and other qualities of that sort. I call this the simplest and the easiest thing when we can make use of it in solving problems*" (loc. cit., p. 21).

Descartes posits *absoluteness* as the distinctive characteristic of this bottom limit of our cognitive faculty because it is the hallmark of those simplest elements of the cognitive process which indicate not only the starting points for problem-solving but the bottom limit beyond which there can be no simpler or more primitive form of insight by the *innate natural light*. Still, in my view, Descartes' enumeration is rather off-hand for while his intention is clear enough, he has not taken the trouble to specify and order these simple natures by their status (e.g. *cause* vs. *similar* vs. *straight*?!). To get a clearer idea of what he means, let's take "*straight*" as an example: a line (on a plane) can be straight or curved. If it is straight, its curvature is 0 and, therefore, it is the absolutely simplest form of a line since it cannot be straighter than straight. The slightest deviation, however, will make it "un-straight." This is easy to understand. Also, it is only in thinking that the line is perfectly straight, as we have discussed in detail with respect to the circle. In contrast, a curved line can be curved in an *infinite number* of ways and directions, it is always *relative* to the notion of "straight" in itself. Thus, the opposite of what is absolute and simple is defined by Descartes as something that is what it is only in a certain *respect*, that is, always relating to or depending on something else. Unstraight is relative to straight, straight is absolute, un-straight is relative. Descartes further recommends that we should "*attentively not*[*e*] *in all things that which is absolute in the highest degree*" – one could also say: the *perfect forms* – and that "*there are very few simple natures which we can intuit straight off and* per se …" (loc. cit., p. 22). With this – even if it is somewhat speculative to say so –, he once again outlines the path that will later be pursued by Kant: filtering out the *small number of pure and abso-*

[1017] René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, VI, p. 22.

*lutely simple natures* and representing them in terms of a system of universal categories. The path thus envisaged by Descartes is the one that Kant chose to pursue during the many years of his silence.

However, in this sense, we also need to take into account the peculiar classification of the *simple natures* that Descartes proposes in the *Regulae*. In Rule XII, he states that

"*… those things which are said to be simple with respect to our intellect are, on our view, either purely intellectual or purely material, or common to both.*"[1018]

Knowledge, doubt, or "*the action of the will*," for instance, are purely intellectual "*simple natures*;" shape, extension, and motion, on the other hand, are purely material *simple natures*; and "*those simples that are to be termed 'common*,'" that is, equally apply to the body and the mind, are "*for instance, existence, unity, duration and the like. (…) These common notions can be known either by the pure intellect or by the intellect as it intuits the images of material things*" (loc. cit., p. 44f.). So, notwithstanding Descartes' peculiar way of expressing it, even when it comes to *material* objects it is still the pure intellect which, by means of the images (*intuition*), recognizes the *simple natures* in things. To explain how this is to be understood, Descartes presents an example from geometry:

"*Fifthly, it is not possible for us ever to understand anything beyond those simple natures and a certain mixture or compounding of one with another. Indeed, it is often easier to attend at once to several mutually conjoined natures than to separate one of them from the others. For example, I can have knowledge of a triangle, even though it has never occurred to me that this knowledge involves knowledge also of the angle, the line, the number three, shape, extension, etc. But that does not preclude our saying that the nature of a triangle is composed of these other natures and that they are better known than the triangle, for it is just these natures that we understand to be present in it. Perhaps there are many additional natures implicitly contained in the triangle which escape our notice, such as the size of the angles being equal to two right angles, the innumerable relations between the sides and the angles, the size of its surface area, etc.*" (loc. cit., p. 46)

This statement provides an important clarification insofar as it, first, confirms that "*it is not possible for us ever to understand anything beyond those simple natures*," i.e. that Descartes indeed conceives of them as the maximal unities of insight that the mind can "all at once" clearly and distinctly grasp; from which it logically follows that objects we have perceived as a unit – such as a triangle – may nevertheless be composed of still simpler elements of thought. This means that even though we perceive them in a figuratively synthesized form, all the concrete objects of the "experience"

[1018] René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, XII, p. 44.

are actually composed of even simpler natures, just as the triangle implies angles, lines, the number 3, etc. Thus, Descartes' approach is oriented to the capacity of the mind, the *natural light*, to step-by-step clarify problems, just as when dealing with a mathematical equation, we step-by-step grasp, by *intuition*, the *simple natures* and, then, connect them, by deduction, into chains of certain knowledge.

Descartes explicitly notes that due to the clarity and distinctness with which we intuit them, we cannot go wrong in our grasping of the *simple natures*. Errors are possible only with such insights as result from connections made by the intellect, i.e. from incorrectly formed chains of individual *simple natures*.[1019] But this concept of *simple natures* and the way they are combined to form complex figurative or intellectual entities can occasionally lead to misunderstandings, primarily by Anglo-American commentators who liken the *simple natures* and the complex composite entities or chains to John Locke's flawed concept of *simple* and *complex ideas*. Here, a very clear distinction needs to be made because in Descartes, the *simple natures* are the most elementary steps of *insight* of the *natural light*, which in a certain *respect* or regarding a certain question grasps, by thinking, *connections* (!) *in* objects. Locke's *simple ideas*, in contrast, are *elements of sensations* or material impressions (corpuscles) that are *passively* recorded as sensory impressions and, as such, directly "through-connected" to the dark cabinet where the operations of the mind get to work to assemble them, like building blocks, into complex entities (see our detailed analysis in the respective chapter!). In contrast, S.V. Keeling quite rightly characterizes the *simple natures* in Descartes as the "*ultimate modes of our thinking*" and the "*ultimate limits to formal analysis*,"[1020] that is, quite clearly, as neither material sensations nor copies of impressions. And L.J. Beck points out that this also highlights yet another essential factor:

"*The simple natures are then characteristics recognizable in all bodies and in all minds, or all existents whether corporeal or spiritual. They are universal, as is clear from the examples, but yet in some sense they have ontological status, they are simple entities which are the fundamental constituents or elements of all bodies, of all minds, of all that exists. (…) They are not fictitious creations of the mind itself; they are not mere figments of mind inserted in or imposed upon an alien reality. The mind's recognition of them is direct and immediate, … a simple act of intellectual vision or 'seeing'.*" [1021]

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1019 "*… there can be no falsity save in composite natures that are put together by the intellect.*" *René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985*, VIII, p. 32.

1020 S.V. Keeling, Descartes, Oxford University Press, London 1934, p. 165 and p. 69.

1021 L.J. Beck, The Method of Descartes, The Clarendon Press, Oxford 1952, p. 72f.

Thus, L.J. Beck actually describes cognition as "*a simple act of intellectual vision or 'seeing'*"! Even though in parts, this interpretation operates beyond Kant's *critical limit*, it has far-reaching consequences and, therefore, warrants a very careful inspection. Let's again take "*straight*" as an example, one of Descartes' *simple natures*. The mind, the *natural light*, will classify a more or less straight line, let's say a diagonal in a square traced in the sand, as a straight line and represent it as such rather than as a curved line although the line drawn in the sand cannot be perfect and we already know that no real-world line will ever have the perfection of the imagined line. Yet the diagonal in the sand is real, and in this sense participates in the *simple nature* "straight" which, in turn, refers to and is *realized* in this diagonal precisely because it is not *thought* as curved. Which raises the question of what is the difference between the *simple natures* and Plato's classical ideas, or Hegel's concretization of the idea. In my view, the difference is that Descartes' *simple natures* are identified, in a concrete situation, by the power of the mind (the *natural light*) which proceeds *bottom-up* in a most elementarily simple way, step by step, in accord with the problem at hand. In contrast, Plato's ideas are model-like entities that always already exist and contain, *top-down*, all things that may participate in them. In Plato, absolute simplicity, as measured by intuitive *instant grasping*, is not a fundamental prerequisite. S.V. Keeling's interpretation follows a similar logic:

"*Simple Natures are not 'ideas', but essential 'ontal' elements, constitutive and explanatory, presupposed throughout the whole of Descartes' Natural Philosophy and his Metaphysics. The theory of representative perception is, indeed, indirect evidence of this, for, eliminate simple natures, and there is nothing left to be represented in distinct ideas, or misrepresented in confused ones.*"[1022]

Keeling then turns to the next fundamental question of why the *simple natures* are no longer explicitly mentioned in Descartes' later works. He suggests that the simple and clear mode of *intuitive evidence* – represented by the criteria of *clear* and *distinct* – had become such an integral part of Descartes' thinking that, with time, he arguably no longer felt the urge to discuss it in any detail and, thus, turned to other issues:

"*No mention is made of them in any work other than the Regulae. Yet the doctrine of innate ideas and the epistemology of the Meditations presuppose the existence of simple natures. His failure to carry explicitly right through his metaphysics and to work out his theory of them in sufficient fullness seems to be mainly due to his later interest being dominated by difficulties of an epistemological rather than an ontological character.*" (loc. cit.)

[1022] S.V. Keeling, Descartes, Oxford University Press, London 1934, p. 236, fn 1.

I think that his adherence to *clear* and *distinct* as the criteria of truth as well as to the *natural light* and the mode of *intuitive insight* which has a key role also in the foundation of the "cogito" is ample evidence that basically, Descartes' doctrine remains consistent up to his very last writings even though the focus may have shifted from mathematics and geometry to more general issues of philosophy, physics, and medicine. By analogy, let's say that whoever has mastered the multiplication up to 100 will not explicitly go into and explain it in a higher mathematics textbook since it will by then have virtually become second nature. Having thus sufficiently described and discussed the definition, classification, and functioning of *intuition* and *simple natures* in Descartes' doctrine, we can now turn to the critical question, namely whether and to what extent *intuitive evidence* as described by Descartes is not actually a case of *visual thinking*, at least in the context of geometric or otherwise visually accessible problems.

## Visual thinking in Descartes

In my discussion of this question, I will now directly focus on *intuitive evidence*, as defined by Descartes in the *Regulae*. As for the *simple natures*, it seems advisable to confine ourselves to those connected with *visible* geometric figures or material objects because for *simple natures* such as "*the action of the will*," existence, or doubt, any association with visual processes is rather unlikely. So, let's once more return to the essential definitions of *intuition* that Descartes offers at one point or another in the *Regulae*:

*Intuition* is the "*clear and attentive mind*" that grasps the truth "*at one glance*"[1023] and in a way that is "*easy and distinct*"[1024] "*by means of a single and distinct act which is similar in every case*"[1025] and, based on the "*light of reason*," can "*form a distinct and, as far as possible, simultaneous conception*"[1026] so "*that there can be no room for doubt*."[1027]

Before analyzing the respective shares of intuition, imagination, and pure thinking in this "*single and distinct act which is similar in every case*" and "*at one glance*" grasps a *simple nature*, I'd like to refer to yet another observation by Paul Natorp where he refers to the necessary "blending" of the intuitive and the conceptual in *intuition*:

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1023 loc. cit., VII, p. 26.

1024 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, III, p. 14.

1025 loc. cit., IX, p. 33.

1026 loc. cit., XI, p. 37.

1027 loc. cit., III, p. 14.

"*From this, it is just one step to the solution found by Kant: the laws of pure intuition and pure intellect* – and we have seen that Descartes' intuitus comprises both of them – *derive their validity for the objects of experience from the fact that it is by them alone that the link between the imagination and the object and, thus, experience is at all possible.*"[1028] (my emphasis)

In my view, the crucial point here is Natorp's parenthetical observation about "*the laws of pure intuition and pure intellect – and we have seen that Descartes' intuitus comprises both of them – …*," for it suggests that the two Kantian starting points of *intuition* and *concept* or, in Natorp's words, pure intuition and pure intellect, are already contained, or coexist, in the *intuitus*, *intuitive evidence*, the gaining of insight "*in a single act*," "*at one glance*"! So we may indeed ask whether what has been captured and described *in actu* and as a whole by Descartes, namely the "elemental" and, of course, always already existing, grown-together *unity* of *seeing* and *at the same time grasping* in the act of *intuition* which is accomplished, in this *single act* and at a glance, by isolating and, thus, determining true knowledge in terms of a *simple nature* – whether this doesn't come quite close, already, to an adequate description of *visual thinking*. Also, as a process, it seems to be simpler and more natural than Kant's programmatical "*disjunction of receptive sensualism and the spontaneous activity of the understanding*,"[1029] i.e. intuition and concept, which, then, require a painstaking process of bringing-together that involves a lot of sub-steps of the imagination such as apprehension, recognition, figurative synthesis, and schematism. Thus, like Natorp, we can choose to understand Kant's logical-analytical breakdown of the act of cognition as an advance towards a logical systematic, but we do risk losing sight of the deep-rooted actual connectedness of intuition and concept in Descartes' *intuitive evidence*!

So, from a perspective of *visual thinking*, let's examine *intuition* such as we have reconstructed it on the basis of Descartes' scattered statements. In this, we need to consider the following important observations by Descartes:

Intuition is the "*clear and attentive mind*" whose grasping of the truth is "*easy and distinct*"[1030] and achieved "*at one glance*"[1031] "*by means of a single and distinct act which is similar in every case*"[1032] and, based on the

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1028 Paul Natorp, Descartes' Erkenntnistheorie, Eine Studie zur Vorgeschichte des Kri-ticismus, Marburg 1882, p. 20.

1029 Kurt Walter Zeidler, Grundriß der transzendentalen Logik, Cuxhaven & Dartford 1997, p. 58.

1030 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, III, p. 14.

1031 loc. cit., VII, p. 26.

1032 loc. cit., IX, p. 33.

"*light of reason*," can "*form a distinct and, as far as possible, simultaneous conception*"[1033] so "*that there can be no room for doubt*."[1034]

1. It is an action of the "*clear and attentive mind*," which means that it is neither vision (Kant) nor the bad immediacy of empiricism but the purely mental apprehension of the "*light of reason*."
2. Cognition is achieved "*by means of a single and distinct act which is similar in every case*," the time it takes is defined as "*at one glance*," and it is an "*easy and distinct*" act of apprehension.
3. In this act, the novel insight is "*clearly and distinctly*" grasped so "*that there can be no room for doubt*."

*Point 1* quite unambiguously states that this is neither "seeing" nor "visual perception" but an act of thinking. Still, the mind needs to be *attentive*, so there must be some *directional activity* since we don't receive knowledge passively and automatically as in Locke where the mind cannot but take in the incoming *simple ideas*. In Rule IX, however, there is another interesting observation where Descartes refers to the close relationship between seeing and thinking, at least with respect to the way information is obtained:

"*We can best learn how mental intuition is to be employed by comparing it with ordinary vision. If one tries to look at many objects at one glance, one sees none of them distinctly. Likewise, if one is inclined to attend to many things at the same time in a single act of thought, one does so with a confused mind*."[1035]

When we face a *manifoldness*, no clear insight can be gained, as Kant explained, we are what Descartes calls "*confused*." But those who "*always devote their whole attention to the simplest and easiest of matters: they become perspicacious*" (Rule IX, loc. cit.). Concerning the hidden relationship of the "grammar of vision" (R. Gregory) and the "grammar of thinking," you can't be much clearer, but there is even more to it, for it also shows how closely Descartes modeled the process of the *intuitus* on that of *visual* insight since he characterizes those who clearly focus on the decisive *relation* as "*perspicacious*."[1036] Occasionally, you get the impression that all these acts of grasping and thinking are actually denoted by verbs such as *intuit distinctly*, *see*, *view*, albeit, of course, with the "eyes of the mind" and as "*mental intuitions*."[1037] And what comes to mind as the

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1033 loc. cit., XI, p. 37.
1034 loc. cit., III, p. 14.
1035 René Descartes, Rules for the Direction of the Mind, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 33.
1036 loc. cit., IX, p. 33.
1037 loc. cit., p. 48.

only plausible explanation for this blending of visual terms and mental acts in the *Regulae* is that it all starts out from Descartes' concern with geometry. This is evident not only from many biographical facts and the many geometric examples but also from the presence, starting with Rule XII and getting massive with Rule XIV, of all those drawings and diagrams that Descartes used as a means of illustrating his argumentation, as well as from the gradual shift towards algebraic equations, especially in the last Rules, including those that were never completed. But if we look at Descartes' argumentation from the vantage point of *geometry*, the blending of "seeing" and "understanding" indeed makes sense, especially when the topic is "pure" mental insight. I strongly feel that like in Plato, it is precisely the geometry-based approach that suggested and revealed this elemental unity and connectedness of seeing and thinking where both happen *at the same time*, "*at one glance*." With philosophers such as Leibniz, who are much more strongly given to mathematical thinking where concreteness plays a minor role and connections are supposed to be determined by purely mathematical and algebraical calculation, this visual tendency is pushed to the background.

*Point 3*, then, states that when facing a connection that answers to a *simple nature*, the mind, provided it is *attentive*, can in the *act* thus described "*clearly and distinctly*" grasp this connection by the *natural light* in such a way "*that there can be no room for doubt*." But *clear* and *distinct*, Descartes' criteria that warrant the truth of what is cognized, are again taken from the world of *vision*. In the "*Principles of Philosophy*," written just a few years away from his premature death, he finally offers a more precise definition of what to understand by *clear* and *distinct*:

"*I call a perception 'clear' when it is present and accessible to the attentive mind – just as we say that we see something clearly when it is present to the eye's gaze and stimulates it with a sufficient degree of strength and accessibility. I call a perception 'distinct' if, as well, as being clear, it is so sharply separated from all other perceptions that it contains within itself only what is clear. (…) For example, when someone feels an intense pain, the perception he has of it is indeed very clear, but is not always distinct. For people commonly confuse this perception with an obscure judgement they make concerning the nature of something which they think exists in a painful spot and which they suppose to resemble the sensation of pain, hence a perception can be clear without being distinct, but not distinct without being clear.*"[1038]

Once more, the reference to vision, "*the eye's gaze*," that is, the visual domain that Descartes starts out from, and the subsequent application of this visual mode to conceptual thinking is quite explicit. Also, the opposite of *clear* that Descartes relies on in his writings is "*confused*," while it

[1038] René Descartes, The Principles of Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 208.

should actually be a term denoting something unclear such as "vague," or "dim," or the like. Then again, "*confused*" is, of course, the more adequate term with respect to geometric or mathematical problems, for they may well appear *confused* to the mind but certainly not *dim*. In this case, the term taken from the visual domain is adapted to the abstract conceptual process but cannot deny its origin. *Distinct*, that is, *adequately differentiated*, or differentiated in keeping with the nature of the respective fact or relation, is again a term taken from the world of vision and transferred to the conceptual domain. Also, it should be noted that virtually all philosophers after Descartes have used the term of "*clear*" to express the complete apprehension, or complete transparence, of a fact. This is true for Ansgar Beckermann, already quoted in the Introduction to this study, and even for Leibniz who had criticized Descartes for being unclear in his definition of *clear* and *distinct*, i.e. the very terms that are made to bear the whole burden of acting as the criteria of truth. In his refined version of Descartes' criteria, Leibniz distinguishes between *clear* and *obscure* concepts, specifying them as follows:

"*Knowledge is either dim or vivid; vivid knowledge is either confused or clear; clear knowledge is either inadequate or adequate; and adequate knowledge is either symbolic or intuitive. Knowledge that was at the same time both adequate and intuitive would be absolutely perfect. A dim notion is one that isn't sufficient for recognizing the thing that it represents—i.e. the thing that it is a notion of … Accordingly, knowledge is vivid if it gives me the means for recognizing the thing that is represented. Vivid knowledge is either confused or clear. It is confused when I can't list, one by one, the marks that enable me to differentiate the represented thing from other things, even though the thing has such marks into which its notion can be resolved ... But a clear notion is like the one an assayer has of gold—that is, a notion connected with listable marks and tests that are sufficient to distinguish the represented thing from all other similar bodies ... that is, when the analysis of the original notion has been carried to completion—then our knowledge of it is adequate. (I don't know whether humans have any perfectly adequate knowledge, though our knowledge of numbers certainly comes close.)*"[1039]

Seizing on Descartes' example of the chiliagon, Leibniz then develops a concept where the thing is expressed in the concept but without our being aware of it. This is what Leibniz calls "blind" concepts (loc. cit.). Kant, in his logic, refers to *clear* and *distinct* concepts but in the *Critique of Pure Reason* also uses the term of *dark concepts* and, prominently, even *blind concepts*.[1040] Overall, we can say that ultimately, and in spite of all the sug-

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1039 Gottfried Wilhelm Leibniz, Meditations on Knowledge, Truth and Ideas, Copyright © Jonathan Bennett 2017, accessed at: https://www.earlymoderntexts.com/assets/pdfs/leibniz1684.pdf.

1040 Cf. Stefanie Grüne, Blinde Anschauung, Die Rolle von Begriffen in Kants Theorie sinnlicher Synthesis, Frankfurt/M. 2009.

gestions for improvement, no other term was found to be more adequate than the term "*clear*" to express the correctness of a connection or fact so "*that there can be no room for doubt*." As early as in Aristotle, "*clear*" denotes the opposite of what is confuse, even the sceptic David Hume uses it in his "Essays and Treatises on Several Subjects" where he literally speaks of "clear and certain," and Kant refers to *clear* concepts besides *dark* and *blind* ones, anyway. But whatever the interpretation of *clear* and *distinct* may be, while the origin of these criteria in the *visual* domain is evident, it is not proof yet that *intuition* is *visual thinking*. So, expectations now focus on *Point 2*, which I have as yet deliberately put on hold. Incidentally, Kant referred not only to the *clarity* of a representation or a concept but also to their *distinctness*. As evidence, Michael Wolff presents a passage from the "Logik Busolt":

"*This definition of the understanding is consistent with the definition proposed by Wolff, namely that the understanding is the faculty of distinct representation: for the logical distinctness of the representation can only follow from judgments. Nevertheless, we should speak of distinct representations in the context of judgments because a distinct representation already implies a judgment. As it is, a distinct concept is possible by a clear property but the representation is tantamount to a predicate of a judgment.*"[1041]

This observation alone suffices to show to what extent, if unacknowledged, Kant, in describing the understanding as the "*faculty of clear representation*" and stating that "*a distinct concept is possible by a clear property*," is standing on the shoulders of the "giant" Descartes.

*Point 2*, then, defines the *act*, i.e. how the *simple nature* is actually grasped, by thinking, in *intuitive evidence*. Which already implies that if a *simple nature* is supposed to be actually grasped and found to be true by the criteria of *clear* and *distinct* in the blink of an eye, this grasping must happen "*by means of a single and distinct act which is similar in every case.*" By describing insight as something that is gained by an "*act which is similar in every case*," Descartes remains in the tradition of Plato who also sought to cognize with the "eyes of the mind" and, in the *Meno*, used the slave boy to demonstrate the respective process where the atemporal ideas must be similarly "seen." On the other hand, Descartes clearly departs from all traditions whose primary orientation is to concepts, dictionaries, propositions, and logicistic approaches. So, what can an "*act which is similar in every case*" mean? What Descartes seems to suggest here is that the act of the *intuitus* is not a random nor a psychological one that may vary

[1041] Quoted from: Michael Wolff, Die Vollständigkeit der kantischen Urteilstafel, Frankfurt/M. 1995, p. 101; Immanuel Kant, Logik Busolt (AA 24, 662.38–663.16). (There is no English translation of Kant's "Logik Busolt;" so this is a provisional suggestion; translator's note)

with the current state of mind of the intuiting person or the external conditions of sensory perception but that in this act, the *simple nature*, provided the thinker is at all able to apprehend it, must invariably be grasped as a whole and in a way that "*is similar in every case*"! This means that provided the *simple nature* is *clearly* and *distinctly* grasped in a single act, the insight into the fact that a diagonal bisects a square into two equal halves cannot result in different findings nor in the grasping of different natures by different people. And since all human beings of a biologically "normal" constitution are endowed with the *natural light*, these elementary and simplest connections, these *simple natures*, must invariably be graspable, or recognizable, in a similar, or uniform, way. Thus, the *intuitus* delivers results that are no less consistent than those delivered by categorially constituted functions, i.e. the concepts of the understanding, the only difference being that it is situationally conceived as a single act. But in Kant, too, and without wanting to anticipate, the categories cannot be applied unless what has been figuratively intuited has been transformed, by *schematism* or the *imagination* ("*Einbildungskraft*"), into something that can be conceptually processed, which transformation is conceived of as the "*product*" of a "*hidden art in the depths of the human soul*" (CPR, B 180/181), that is, the "product" of an activity of the soul and, thus, ultimately, an act.

But what is crucial in Descartes is *HOW* the *intuitus* happens and *how* it can result in certain knowledge. In exploring this question, I will explicitly confine myself to insights which are gained by *figurative intuition*, that is, capable of being visually perceived, as in geometry. What is at issue here is the – previously described – "*single and distinct act which is similar in every case*" and by which the respective *simple nature* is grasped "*at one glance*." So, this is clearly *not* about conceptual-discursive thinking, *not* about reflection or analysis, *not* about weighing or differentiating against each other or generating judgments and conclusions. It is *not* about confronting a thesis with an antithesis and, thus, generating a synthesis, it is *not* about the step-by-step procedure of obtaining a concept by synthesizing different sensory impressions and characteristics by certain operations of the mind, and it is certainly *not* about any cognitive act that would take longer, even if only a second, than this instant in which an absolute truth is grasped – aha! – "*at one glance.*" So, how can we "*at one glance*," in a *single act* and, what is more, "*easily and distinctly*" grasp knowledge so "*that there can be no room for doubt*"? And let's not forget that this, as explicitly specified by Descartes in Rule XII, is the *only* (!) way for us to gain certain knowledge at all since, basically, the subsequent work of the deductive procedure only serves to connect the individual *simple natures* grasped by the *intuition* into chains or systems of chains. It is true that this process of connecting the individual chains, or complex

connections, one has grasped may in turn involve some intuitive act, but since this would further complicate this important discussion, I will leave it aside here. As for the best way of approaching this crucial question we can, anyway, rely on Descartes' own recommendation, already quoted above, that "[*w*]*e can best learn how mental intuition is to be employed by comparing it with ordinary vision*"!

So, let's follow Descartes' concrete directions and compare the intuitus with "*ordinary vision*," combine it with the insights we have already gained, and try to exploit this knowledge for an understanding of the act of *intuition*, i.e. *intuitive evidence*. For behind all this, there is the crucial further question of how it is possible at all to grasp reality, or the real relations and conditions "such as they are," without falsifying or even inventing them. As it is, this may even bring to light functional connections whose formation is rule-based rather than due to "contingency,"[1042] as even some great philosophers seem to have assumed at this decisive point of their systems. Thus, a first insight gained in our study of *vision* was that its defining principle are the *laws of gestalt* as well as the fact that the perceptual system continually seeks to conform to a certain *innate*, ideal organizational structure when configurating the infinitely diverse interpretations of a "given" *intuition* in such a way that a meaningful perception becomes possible and situational patterns are made to prevail that are as *simple* as possible as well as conforming to a "*good gestalt*." The perceptual system obviously keeps trying to adhere to a certain *order* or, in other words, to impose the simplest possible *ideal organization* unto the disorganized world of chaotic individual perceptions, the *manifoldness*. At the same time, perception resists messy, confused, and asymmetrical arrangements. Wolfgang Metzger – previously quoted – refers to the "*love of order*" of our senses, with order being understood, in Kantian terms, as adherence to certain rules. Furthermore, we have seen that with respect to time, this formation of "good gestalts" must happen lightning-fast since in the wilderness, or the no less dangerous big-city traffic, you can't wait for several minutes until the perception settles for a definite gestalt, distance, side of the street, etc. Also, we are delighted when "*all at once*" and without recourse to discursive judgment and conclusion (… the left brow is three millimeters higher than the right one, ergo …) we recognize the face of a loved one among all those innumerable other faces. And there may be other perceptual processes, too, that can, by comparison, help us to understand the *intuitive evidence* of the *intuitus*.

At the end of his Book: "*On Problem Solving*," Karl Duncker, one of the eminent figures of gestalt theory, already poses the question that points the way:

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[1042] Immanuel Kant, Critique of the Power of Judgment, Cambridge University Press 2000, § 77, p. 274–279.

"*But how is it that with many people the perceptual structuring dominates so excessively? Clearly, with them these perceptual structures play an indispensable role, more or less as do the visual images with people of the visual type.*"[1043]

This preference for figurative structures in thinking and problem solving is another indication that thinking is closely linked to visual processes, if not evolutionarily developed from them. This idea is also at the heart of the reflections of Jonathan Schooler et al., who were particularly intrigued by similarity of the *suddenness* with which *insight* into a seemingly unsolvable problem was gained and the suddenness with which something is suddenly, "*all at once*," grasped in certain visual tests:

"*Having reviewed the mechanisms underlying the formation and overcoming of the impasses to insight, we now must confront the central question of insight (at least, when it is defined as the sudden shift from an impasse state to a solution state): How is it that the solver moves so suddenly from an impasse to a solution state? We share the view that the sources of the suddenness of insight are closely aligned with those associated with the suddenness of various perceptual processes. Throughout our previous discussion of the causes and techniques for overcoming impasses, we have attempted to draw parallels between the processes of insight and those of perception.*"[1044]

The conclusion drawn by this team of researchers comes very close to what Descartes discovered as early as in the 17th century, namely that "[*w*]*e can best learn how mental intuition is to be employed by comparing it with ordinary vision*." Similarly, Schooler et al. hold "*that the sources of the suddenness of insight are closely aligned with those associated with the suddenness of various perceptual processes*." Also, they suggest "*that suddenness of both insight and visual recognition may be associated with situations for which there exists a potential source of coherence that can unite a seemingly disparate set of elements*" (loc. cit., p. 579). Schooler refers to a "*source of coherence*" as a constant function that works toward the unity of the manifoldness of phenomena. This clearly highlights the close connection between seeing and thinking as suggested by various lines of research, the basic principle, of course, still being that there can be no increase in knowledge by mere "seeing" and that any such increase is always the result of a cognitive act of reasoning and judgment. In the *intuitus*, however, this act is condensed into the "blink of an eye" in which *seeing* and *cognizing* must happen *simultaneously*. But if seeing is not cognizing, what, then, is going on in this instant that is clearly too short for even a single sentence to be formed, a single conclusion to be drawn? Obviously, it must

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1043 Karl Duncker, On Problem Solving, Washington, DC, American Psychological Association 1945, p. 111.

1044 J. Schooler, M. Fallshore, St. Fiore, Putting insight into perspective, in: Robert J. Sternberg and Janet E. Davidson (eds.), The Nature of Insight, Bradford Book MIT Press, Cambridge/London 1995, p. 576f.

be *visual thinking*! Let's first consider the faculty of *subitizing*, already previously discussed. This faculty, first ascertained in 1949 by Kaufman and colleagues, enables humans to correctly identify, *at one glance*, small sets of one to six units or objects. No counting or computing is involved in the process, the *correct result* is grasped – in Descartes' words – "*at one glance*" so "*that there can be no room for doubt*" or, in Mandler & Shebo's formulation with respect to the act of subitizing: "*… the rapid, confident, and accurate report of the numerosity of arrays of elements presented for short durations.*"[1045] Regarding "*that suddenness of both insight and visual recognition*" (Schooler et al., loc. cit.), there obviously is perfect congruence between Descartes' observations and discoveries and those of modern science.

Having thus established the congruence between the faculty of subitizing – today validated by science – and Descartes' reasoning, we can now deliver a first summary that will allow us to ascertain the actual presence of *visual thinking* in Descartes' concept of *intuitus*, *intuitive evidence*. Descartes himself initially realized, observed, tested, and perfectly described this faculty, but was still unable to isolate *visual thinking* per se because notwithstanding his break with medieval syllogistics and his insistence that propositional reasoning should always also take into account all the representations that accompany the thought process, he was confined to the philosophical tradition of conceptual discourse. If, however, we go along with his description of thinking, in the *Regulae*, as the "*clear and attentive mind*" that grasps the truth "*by means of a single and distinct act which is similar in every case*" as well as "*easy and distinct*" and relies on the "*light of reason*" to "*at one glance*" "*form a distinct and, as far as possible, simultaneous conception*" so "*that there can be no room for doubt*," this has all the marks of an absolutely original philosophical approach (perhaps with the exception of Augustine's *Confessions*, Book X) and a momentous turning point in the philosophy of modernity. It is only much later that similar attempts were made, i.e. by Husserl, albeit in a quite different setting.

Now we have already shown that for Descartes, "seeing," that is, intuition alone cannot generate knowledge even though it is an indispensable starting point for cognition, and that the *imagination* plays a no less essential role in preparing the insight to be gained by "turning and rotating" objects or geometric figures, or by imagining novel formations. But while all these mental activities certainly work to enhance the chances for and applications of the possible solutions of a problem at hand, they do not create new knowledge, they do not constitute an insight, they *are not* the process that *warrants certain* knowledge. Descartes has made it quite

[1045] Mandler, G., & Shebo, B.J. (1982). Subitizing: An analysis of its component processes. Journal of Experimental Psychology: General, 111, 122.

clear, however, that this is nothing to do with discursive-deductive procedures and that true knowledge, real new insight, is gained in the very *act of the intuitus* thus described, where the simple nature is captured and *at the same time* (!) understood. Therefore, we can only conclude – and here, objections could, of course, be raised since this conclusion is after all based on a simple procedure by elimination – that only one possible explanation for this cognitive act remains, namely the faculty of *visual thinking*. For while, on the one hand, it is clearly *neither* "seeing" *nor* imagining, it *cannot*, on the other, be one of the traditional forms of conceptual-discursive reasoning because these never happen "*by means of a single and distinct act which is similar in every case*," thus enabling us, in a way that is "*easy and distinct*," to recognize all our true knowledge in a clear and distinct form. The *simple natures* that are "*all at once*" recognized and grasped in this *act of visual thinking* are, thus, the basis of our cognition provided this cognition pertains to *figurative objects* and connections, or schematic representations such as those, for instance, in geometry. How these processes take place in the domain of conceptual-discursive thinking and to what degree they resemble the acts of visual thinking or already represent a further development is a matter that would require an in-depth study based on the correlation between visual and linguistic functionality (grammar) and, as such, exceed the framework of this study.

So, what would Descartes' epistemology look like if *visual thinking* were slotted in as an independent faculty somewhere between the *senses*, the *imagination*, and cogito-anchored *conceptual thinking*? First of all, there are the statements – previously quoted – by Descartes to the effect that the *senses*, i.e. direct *intuition* without guidance by the mind, is prone to errors and can, therefore, only have the status of a first "source of information" without guarantee of certainty. In the *Regulae*, Descartes conceives of the *imagination* as a faculty that is subordinate to the understanding, thus differing from Kant where, at least in the B edition of the *Critique of Pure Reason*, the imagination – albeit somewhat differently conceived – is part of the understanding and the higher faculties of reason. In the chapter on Kant, this will be discussed in more detail. However, in "*Principles of Philosophy*," a later work by Descartes, the status of the *imagination* is modified, with the consciousness in general described as *perception* which, in turn, is subdivided into *sensory perception*, *imagination*, and *pure understanding*.[1046] But while this triple division clearly foreshadows Kant's structuring of the consciousness, it does not solve the problems under discussion. For the act of the *intuitive* grasping of geometric truths by the *natural light*, their certainty being warranted by the

[1046] René Descartes, The Principles of Philosophy, in René Descartes, The Philosophical Works of Descartes, Translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, Vol. 1, Cambridge University Press 1985, p. 204.

*clearness* and *distinctness* of what was cognized and the *innate* common notions, is still the same even in the *Principles of Philosophy*. If, therefore, we take *geometric figures* as an example and start out, as Natorp and Cassirer did, but also Dennis Sepper, from the *epistemology* set forth, in much more detail, in the *Regulae*, the result would be as follows:

First, there is the confused information about the figures that is provided by the *senses* but can never suffice for us to completely, that is, clearly and distinctly, cognize them in their deep structure; a situation which, as previously discussed, foreshadows the status of the thing-in-itself and the phenomena in Kant. The imagination, then, uses this confused information of the senses to "*draw*" "*its images.*" This implies that besides its image-generating capacity, the imagination has another essential function which enables it to productively configure the information received from the *senses* in such a way that the understanding can process it. In this, it roughly corresponds to the *productive imagination* of the B edition of Kant's *Critique of Pure Reason*. Furthermore, we can draw geometric figures in the imagination and "turn and rotate" them, which corresponds to Kant's construction in pure intuition but, in Descartes, belongs to the domain of the *imagination*. But all this is not yet *cognizing*, nor an activity of the *understanding* in terms of making judgments. For the images thus conceived, or drawn, only allow for certain knowledge of what is *clear* and *distinct*. Here, Descartes' granular mode of cognition, at least in the *Regulae* where he still deals with these things in detail, eminently differs from Kant's ordering of the faculties. For in Kant, sensibility (whatever this may be from our present point of view) needs to be transformed by the *figurative synthesis* and the *schematism* of the imagination into the conceptual language that is "spoken" by the understanding.

In Descartes, it is the act – already repeatedly described – by which we *all at once*, *at one glance*, grasp the *simple natures*, i.e. what is *clear* and *distinct* in a visible context, in this case, geometric figures. Quite clearly, however, this can only be an activity of the pure understanding, which implies that, carefully thought through, Descartes' doctrine must allow for a form of thinking that happens *visually* but is, at the same time, "pure," and sufficient for us to make sense of elementary situations. In the introductory chapters of our present study we have analyzed these forms of *thinking without language*, taking chess, the deaf, and geometry as examples. As it is, cognition that is "seeing" and, *at the same time*, thinking – "at a glance" and in a single act – is the hallmark of *visual thinking*. It is an achievement that goes far beyond any form of "sensibility," it is more than a mere representation or *imaginatio*, and, most of all, it is not a linguistic-conceptual procedure which would be too slow by far to carry out, e.g. by silent speaking, this kind of reasoning in a split second. There may, of course, be a second system where abstract, conceptual

reflections that do not relate to objects or anything more generally intuitive happen faster or even in completely different ways, but this is not the topic of the present study. So, this is how the question of the structure of Descartes' epistemology can now be answered: *perception* by the senses is followed by the workings of the *imagination*, and if what is at issue are visually perceptible *structures* and *relations*, *visual thinking* – lightning-fast, intuitive, clear and distinct – takes action, whereas in the case of abstract relations, or relations that cannot be visually perceived, thinking switches to the *linguistic-conceptual* mode and is, in addition, capable of varying the *respect* in which to reflect on the insights gained by *intuitive evidence*. This means that *visual thinking*, being unable to generate novel *respects*, has always only one perspective from which, or one respect in which, it can grasp the *simple nature*. All these functions, or achievements, of the *spontaneous, creative self-consciousness* are anchored in the *unity* of the *cogito* of the *subject*. In Descartes' *Principles of Philosophy*, an additional factor comes into play, namely *volition* that directs the "attention" of the thinking individual or, in more modern terms, controls or changes the *perspective* from which, or the *respect* in which, the understanding reflects on a connection. Thus, Descartes is the first thinker, in modern philosophy, to have discovered the importance of the *respect* or *perspective*, this essential, intentional guiding function of any thinking which Cassirer will later elaborate on in his study on the concept of function.

**Conclusion:**

In our analysis of Plato's *Meno* dialogue and by reconstructing Descartes' epistemology in the *Regulae*, we have already worked out two cases where the faculty of *visual thinking* is a traceable or, rather, undeniable presence in the ductus and the logic of the respective argumentation; also, in a further step, we have already tried to establish first links to Kant's epistemology:

1. In both cases, our argumentative strategy was to focus on the very point where sudden insight happens, and to show that neither "seeing" nor "seeing as …" sufficed for this insight to be gained, this increase in knowledge to occur. At the same time, the examples involved were visually accessible (i.e. geometric rather than abstract) problems or domains where a solution was found, or a new insight gained, by a visual approach.
2. In both cases, this constellation warranted the conclusion that the new *insight* that had obviously been gained could only have been brought about by *visual thinking*. In the transition to Kant, this results in the interesting constellation that with the *imagination*, Kant posits a function, or faculty, which he himself de-

scribes as "*intellectual on the one hand, sensible on the other*," that is, a "mixed faculty" of sorts that is supposed to synthesize sensibility and understanding and whose status in his doctrine is marked by a peculiar indecision between sensibility and understanding.

3. Kant's dichotomic distinction between the "extreme ends" of *sensibility* and *understanding*, or *intuition* and *concept*, opens up a wide range of *intermediary* functions, faculties, and transitions. This "disjunction" of sensibility and understanding, which necessitates an act of *blending*, an intermediary faculty, a third term that serves to bring together these "*two extreme ends*" of cognition will be the next problem for us to tackle – for since *a priori synthesis* is indeed the crucial operation of thinking in Kant, it may perhaps also show how and where to find evidence for *visual thinking* in the architectonic of the *Critique of Pure Reason* and, at the same time, enable us to clarify many an "obscure" passage!

# V. The ambivalent position of *imagination* and *schematism* in Kant's *Critique of Pure Reason*, and the role of *visual thinking*

This chapter serves more than one purpose: *firstly*, I want to show that between the "*extreme ends*" of *sensibility* and *understanding*, or *intuition* and *concept* (with the *human understanding* conceived of as exclusively capable of *conceptual* thinking in the *Critique of Pure Reason*), there is a many-layered texture of partly overlapping *faculties*, *powers*, "*hidden arts*," "*operations*" and functions in Kant's doctrine, in particular when the *imagination* comes into play. Basically, Kant's approach suffers from the fact that the conception of the two *extreme ends* – extremes which at some point have, after all, to be brought together, blended, synthesized – implies, or at least suggests, that the two extremes of *intuition* and *concept* are two equivalent and logically equipotent elements of the cognitive process. Now, it is evident that sensibility is a "*source*" of knowledge, for without a certain informative input in the cognitive process, our conceptual thinking would be blind. But this is the "fuel" of cognition, as it were, it is not the engine, and not at all equivalent in terms of steady performance, structure, complexity, and worth. There is no driving without fuel, that much is true, it is an indispensable component of the overall process, but for all that, it is not on an equal footing with the engine since what accounts for the performance of the engine is not the fuel but the power and structure of the engine itself.

In epistemic-didactical terms, the conceptual construction of Kant's approach means that the *Critique of Pure Reason* is from the start committed to a step-by-step progress from one "*extreme end*" to the other. The cognitive process does not start out from the self-conscious ego and its judging and concluding thinking; rather, it is a processual step-by-step upward transformation from "*sense experience*" to *concept*, with the status of the latter as an "*extreme end*," moreover, remaining debatable. My own view is that in deference to the empiricists, Kant had let himself be taken in by their atomistic-passive theory of perception at this point, with the result that both of his starting points, i.e. sensibility and understanding, are based on the "experience error." The consequences are twofold, and problematic. On the one hand, conceiving of sensibility as a passive-receptive faculty means that Kant *in part* adopts Locke's and Hume's utterly wrong epistemological assumptions, extensively discussed in the respective chapters, although he ultimately seeks to epistemically-systematically overcome them in the transcendental aesthetic and transcendental deduction. On the other, due to the – flawed – empiricism-inspired starting point of sensibility, he needs to insert quite a number of

intermediate steps, faculties, and transformation processes to be able to concretely account for the movement away from passive-receptive sensibility and towards the intellect, a constraint that is particularly salient in the first edition – the *A edition* – of the *Critique of Pure Reason*. In this line of thought, the simultaneous, step-by-step convergent movement from *intuition* to *understanding* and vice versa would be like eating a sausage slice-by-slice from both ends at once; and yet, at some point, the "*image*" must be transformed into a *concept* or, inversely, the concept must seize upon an adequate "image" – pictorial material must become mind-compatible, and the mind must find an adequate form. Pretty difficult.

In contrast, Kant's positioning of the understanding is very clear since for him thinking, that is, understanding and reason, happens exclusively *in the medium of the concept*. Here, thinking is always strictly *conceptual* thinking, as he quite clearly states:

"*But besides intuition there is no other kind of cognition than through concepts. Thus the cognition of every, at least human, understanding is a cognition through concepts, not intuitive but discursive*." (CPR, B 93)

This is the very same strictness that underlies, for example, his arguments in favor of the *a priori* nature of mathematics as well as the necessarily intuitive nature of geometry. Just take the way in which he argues the *a priori* character of the addition of 7 + 5 = 12: because the concept of *twelve* is simply not contained in the concepts of *seven* and *five*, that is, cannot be extrapolated from the concrete, *verbal* concept, we must resort to *intuition*, our fingers, as it happens (which again raises the question of the presence of visual thinking in the ostensive procedure!). Or, perhaps even more conspicuous, his example from geometry:

"*Take the proposition that with two straight lines no space at all can be enclosed, thus no figure is possible, and try to derive it from the concept of straight lines and the number two; … All of your effort is in vain, and you see yourself forced to take refuge in intuition, as indeed geometry always does.*"[1047]

Since, strictly speaking, the geometric construction cannot be derived from the *concept* alone, *intuition* must help. Already in the Preface to the first edition of the *Critique of Pure Reason*, where Kant comments on the "*clarity*" of his deliberations, this double-barreled approach is more than evident:

"*Finally, as regards* ***clarity****, the reader has a right to demand first* ***discursive*** *(logical)* ***clarity, through concepts****, but then also* ***intuitive*** *(aesthetic) clarity through* ***intui-***

[1047] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, B65/66.

***tions**, that is, through examples or other illustrations in concreto.*" (CPR, A XVII/ XVIII; bold in the original)

Interestingly, Kant, in the German text, refers to Descartes' concept of "*distinctness*" ("*Deutlichkeit*") rather than clarity ("*Klarheit*"), and even to the concept of "*intuitive distinctness*" ("*intuitive Deutlichkeit*"), a point that is lost in the English translation. Kant, however, associates this "*intuitive Deutlichkeit*" with his concept of "*intuition*," where he uses concrete examples, for instance geometric constructions, to explain matters of content. The crucial point here is that in Descartes, "*intuitive distinctness*," as previously discussed in some detail, is also a kind of thinking, an *intellectual intuition*, that is, a *simultaneous* act of seeing and grasping, while in Kant, *intuition* is quite clearly defined as real seeing, that is, an *immediate* picture, organized in terms of space and time, of the *individual object* ("*a manifold of sensibility that lies before it a priori, which the transcendental aesthetic has offered to it*" CPR, B 102), but still as the "extreme," or "lower," end. It is only after *figurative* and *intellectual synthesis*, as set forth in the B edition, that what is seen can be grasped by conceptual thinking. Thus, in Kant, *intuition* as a "*kind of cognition*" (see above) is from the start overcharged by far because it is basically defined as the immediate, singular, sensory affection of the sensibility by a given object. As a consequence, there is the problem of how thinking, being strictly confined to the *concept*, is supposed to ever come into contact with the manifold of the *passively received* sensory impressions, let alone impose its laws on these intuitions, or phenomena; or, not to put too fine a point on it: how stimulations of the retina *à la* Quine are supposed to metamorphose into abstract concepts such as value or freedom. And because of this problem that results from his adoption of the hopeless starting position of empiricism, i.e. "*sense experience*," Kant needs to account for and reconstruct the entire path of the transformation of these *passively received* sensory impressions. It takes a second edition – the B edition – for Kant to partly revise this approach and realign the *Critique of Pure Reason* in terms of a moderate *rationalistic* view. But this readjustment now also affects the mediating middle function between the "*extreme ends*," namely the *imagination*, and this is why, as a logical consequence, Kant repositions the latter from sensibility to the understanding in the B edition.

This change in thinking and this indecision are particularly evident in the modifications that Kant makes in the newly-conceived chapters of the B edition of the *Critique*, which, in turn, differ in certain aspects such as, for instance, the *imagination*, from his reasoning in the *Reflections* and the writings on *Anthropology*. This has of course been commented upon, for the changing and multifaceted role of the *imagination* in Kant has drawn the attention of numerous enemies of *Neo-Kantianism*, first of all

Heidegger and his follower Hermann Mörchen, for whom Kant's conception in the A edition was the "natural" starting point.[1048] Also, Kant's analysis and discussion of the numerous faculties and intermediate steps from affection to senses to concept and judgment has kept busy whole generations of philosophers.[1049] The problem becomes even more complicated when each faculty, or function, is examined in itself, in isolation from Kant's step-by-step procedure, because the result of the respective studies invariably depends on the position of the faculty, or function, in the architectonic system of the *Critique of Pure Reason*, and because the two editions – as I see it – differ in the "*perspective*", or line of thought, that governs Kant's procedure. In the A edition, true to the empiricist tradition, the procedure is "bottom-up," that is, starts out from the "lower end" of "*sense experience*," whereas in the B edition, it is "top-down," that is, starts out from the "headstone" – the transcendental ego. This has been repeatedly discussed in the context of *transcendental deduction*, i.e. "bottom-up" vs. "top-down" deduction, but, in my view, indeed applies to the entire conception and structure of the *Critique of Pure Reason*! Thus, the individual elements of the architectonic structure remain more or less the same, but while in the A edition, the individual steps, faculties, functions are developed from the empiricism-inspired vantage point of *sense experience*, the B edition is marked by a shift towards a more balanced, more *rationalism*-inclined perspective! The result, therefore, is a modification, or actual re-writing, of the intermediary chapters and passages in accordance with the changed perspective.

Once the position of the *imagination* in the architectonic is made sufficiently clear, and Kant's respective point of view is duly considered, I will, *secondly*, single out the point in the Kantian structure of reason where *visual thinking* can be supposed to have its rightful place. This will enable me to do justice, from a modern-day perspective, to the facts as well as the logic of the faculties and functions, on the one hand, and keep

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[1048] Hermann Mörchen, Die Einbildungskraft bei Kant, Tübingen 1970; Martin Heidegger, Kant und das Problem der Metaphysik, Frankfurt/M. 2010 (1951).

[1049] Herbert Herring, Das Problem der Affektion bei Kant, Köln 1953; Gerold Prauss, Erscheinung bei Kant – Ein Problem der „Kritik der reinen Vernunft", Berlin 1971; Karl Hepfer, Die Form der Erkenntnis – Immanuel Kants theoretische Einbildungskraft, München 2006; Kurt Walter Zeidler, Grundriß der transzendentalen Logik, Cuxhaven & Dartford 1997; Matthias Wunsch, Einbildungskraft und Erfahrung bei Kant, De Gruyter Berlin/New York 2007; Robert P. Wolff, Kant's Theory of Mental Activity, Harvard College Gloucester 1973; J. Michael Young, Kant's View of Imagination, Kant-Studien, Band 79, Heft 1–4, p. 140–164; Sarah Gibbons, Kant's Theory of Imagination, Clarendon Press Oxford 2002; Michael L. Thomson, Imagination in Kant's Critical Philosophy, De Gruyter Berlin Boston 2013; Rudolf A. Makkreel, Imagination and Interpretation in Kant, University of Chicago Press Chicago/London1990, and many more.

me from messing up Kant's well-considered structure of reason while re-instating its full rights to the more conclusive *rationalistic perspective*, on the other. On this account, I will, *thirdly*, reconsider Kant's balancing act between *empiricism* and *rationalism* because this will allow me to further clarify the starting points of the *Critique of Pure Reason* themselves, which, in turn, will help me to determine the proper place of *imagination* and *visual thinking*. The result will be that a rationalistic reading of the *Critique of Pure Reason* can steer clear of many uncertainties and ambiguities such as, for instance, the Janus-faced nature of the imagination in the A version of transcendental deduction compared to the B version, and the imprecisions of such notions as *sensibility*, *affection*, *phenomenon*, *image*, and *representation*. Therefore, it will be crucial to start out from intuition and re-examine the procedure of image-formation, the formation of visual representations, in Kant and, then, see how this can be brought into line with the respective procedure in modern *vision science*. In this, it will be most essential to delimit the domains that correspond to the cognitive image-formation from those that, strictly speaking, are conceived of as a matter of conceptual thinking alone by Kant. In my view, transcendental *schematism*, described by Kant as "*intellectual on the one hand, sensible on the other*," is subject to an ambiguous positioning between visual and conceptual thinking, as well as an inconsistency between what it is meant to be and how it is actually realized – a *gap* that could well mark the very point where *visual thinking* could find its place in the *Critique of Pure Reason*. Also, it would allow for an even more stringent and well-founded structuring of the *Critique of Pure Reason*.

## General preliminary considerations concerning the position of the *Critique of Pure Reason* between empiricism and rationalism

Let's start with the overall strategic orientation of the *Critique of Pure Reason*. I will abstain from going into the by now innumerable commentaries that have in various ways described and explained its genesis and structure. Even Ernst Cassirer, for instance, who argues that Kant's philosophical system, being a consummate and self-explanatory system that constituted a radical break with all its predecessors, was less than any other "*in need of a recourse to the conditions of its making*,"[1050] still dedicates almost seventy pages to its complex genesis. In most of the Anglo-American literature on Kant, his system is seen as an overcomplicated and questionable extension of Locke's and Hume's philosophy by other means. Typical cases of this type of partly insensitive, partly mistaken

[1050] Ernst Cassirer, Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit, Band II, Darmstadt 1995 (1922), p. 585.

commentaries are Weldon's *Kant's Critique of Pure Reason*, Jonathan Bennett's *Kant's Analytic*, or Peter Strawson's *The Bounds of Sense*, among others, who, in spite of their rather conscientious interpretational efforts, are time and again surprised that Kant's philosophy turns out to have a rationalistic core.[1051] But as the title of the *Critique of Pure Reason* already suggests, Kant's intention obviously was to set bounds to pure reason – rationality –, whereas the natural aim of the empiricists is to make the orientation to *sense experience* the universal starting point and to eliminate or downplay the system's idealist-rationalistic core.

From a perspective of *rationalism*, Kant's strategy of course presents itself quite differently. Firstly, Kant, as is well-known, came from the so-called "dogmatic" school of thought of *Wolff* and *Baumgarten*[1052] and had in mind *Leibniz* as a brilliant philosopher of international renown and an immediate precursor and exponent of *rationalism*, who, with his monadology, had created a philosophy that was original but could, in the final analysis, not be operationalized.[1053] The chapter *On the amphiboly of concepts of reflection* is specifically dedicated to a critique of this rationalistic mastermind, with Kant clearly demarcating himself from Leibniz and "rationalism."[1054] *Descartes*, as previously described, plays a minor role and is primarily staged as the scarecrow "Cartesius" that serves as a vehicle for Kant's would-be "*Refutation of Idealism*." Thus, for Kant, Descartes is not the founder of modern rationalism and modern philosophy in general but a cardboard character and a vehicle for him to voice his critique of idealism, if a misunderstood one. In contrast, and in line with this clear and extensively argued demarcation from his *rationalistic* predecessors, Kant symbolically opens his *Critique of Pure Reason* with a commemoration of Baco de Verulam's *Instauration Magna*, *Francis Bacon*'s Novum Organon (CPR, B II), that is, one of the foundational works of *empiricism*, and always speaks in praise of the "*famous Locke*" whom he credits with having instigated the whole study, and of course of the eminent and ingenious David Hume who is supposed to have "*first interrupted my dogmatic slumber*" (*Prolegomena*, Preface and §3), although precisely what Kant had

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1051 Peter Strawson, The Bounds of Sense, An essay on Kant's Critique of Pure Reason, Routledge, London/New York 2007; T.D. Weldon, Kant's Critique of Pure Reason, Clarendon Press Oxford 1958; Jonathan Bennett, Kant's Analytic, Cambridge University Press Cambridge 1966.

1052 Ernst Cassirer, Kants Leben und Lehre, Darmstadt 1977, Chapter II.

1053 Cf. Kuno Fischer, Leibniz, Wiesbaden 2009, p. 668, esp. on the decline of dogmatic philosophy and the shortcomings of monadology.

1054 Predrag Cicovacki, Kant's Debt to Leibniz in: Graham Bird (ed.) A Companion to Kant, Wiley-Blackwell 2010, p. 79f., points out that at the same time, Kant had adopted a number of things from Leibniz (apperception!).

read of Hume's writings is unclear to the present day.[1055] This is also emphasized by Casper Zijlstra:

"*Kant, in his Logik (Jaesche, 1800), clearly thinks Bacon was of more importance for modern philosophy and science than was Descartes.*"

However, Zijlstra says, anyone who has devoted time and effort to a reading of Descartes' writings cannot but call into question, just as Natorp did, whether Kant had really read, or, rather, studied Descartes' writings in any detail: "*It is even doubtful whether Kant had read the works of Descartes.*"[1056]

Furthermore, from a perspective of rationalism, the very beginning of the *Critique of Pure Reason* is questionable. For already in the Introduction, Kant clearly states:

"*There is no doubt whatever that all our cognition begins with experience; for how else should the cognitive faculty be awakened into exercise if not through objects that stimulate our senses and in part themselves produce representations, in part bring the activity of our understanding into motion to compare these, to connect or separate them, and thus to work up the raw material of sensible impressions into a cognition of objects that is called experience? As far as time is concerned, then, no cognition in us precedes experience, and with experience every cognition begins.*" (CPR, B 1)

However, there indeed is a doubt here, in the sense taught by Descartes, for many cognitive operations are innate, and there is scientific evidence today that even newborns are capable of certain cognitive achievements so that even "*as far as time is concerned*," so-called experience (*sense experience*) cannot invariably precede cognition, for *innate* is always "*earlier*," even though the newborn takes in the first sensory impressions. The innate "*cognitive faculty*" is already structured and intact *before* sensory impressions are taken in. And vision science has already told us that even the "*raw material of sensible impressions*" has already been selected, structured, interpreted, and organized in accord with the laws of gestalt, so that what is described as "*experience*" is never "given" in this allegedly *unmediated* form but has always already been brought into a cognitively generated form which can, then, be conceptually processed by understanding and reason. Therefore, in the light of modern science and rationalism, what Kant states with utter conviction in the very first paragraph of the *Critique of Pure Reason* is not only far from being beyond doubt but is

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1055 Cf. Günter Gawlick / Lothar Kreimendahl, Hume in der deutschen Aufklärung, Stuttgart-Bad Cannstatt 1987.

1056 Casper Zijlstra, Cohen's transformation of the Cartesian innate ideas to the Kantian a priori principles, in: Detlev Pätzold/Christian Krijnen (eds.), Der Neukantianismus und das Erbe des deutschen Idealismus: die philosophische Methode, (Königshausen & Neumann) Würzburg 2002, pp. 22 and 25, fn. 8.

actually obsolete, even though already the second paragraph offers a partial relativization (see the above observations by Kambartel and Zeidler).

My point here is that in the past sixty years or so, Kant has always been interpreted from the perspective of *empiricism* or its modern form, i.e. analytical philosophy, or, rather, has been progressively, if discreetly, repositioned in this sense. From a perspective of *rationalism*, however, it would rather seem that Kant, seeking to extricate himself from 17th- and 18th-century German "dogmatic" philosophy and to express his affinity to and reverence for Isaac Newton had, in anticipatory obedience to the empiricists, strayed too far from his own rationalistic roots, a not infrequent psychological effect when cords are cut. This deference, or allegiance, to *empiricism* is also noted by Hermann Cohen in his commentary on the *Critique of Pure Reason*:

"*It is as if the author wanted, first of all, to come to an understanding with the reader about the notion, the word of 'experience.' 'Don't think that I am going to speculate against experience; I will not question it. (…) Any cognition must, rather, begin with experience.' The Critique will not make common cause with whoever starts differently. All of the first paragraph sets forth this unquestionable beginning. Only the second paragraph introduces the novel problem. 'But although our cognition commences with experience, yet it does not on that account all arise from experience.'*"[1057]

This reverence to empiricism, totally unnecessary as it is, would have been less momentous if it had just been addressed to the "dogmatic" of the Wolff-Baumgarten school. But in his effort to free himself from the dogmatic of his predecessors, Kant went too far in complying with the empiricists by adopting the erroneous doctrine of "*sense experience*" and the "*given*" which, thus, became the starting point of the *Critique*. And yet, at the same time – and this is what makes the *Critique of Pure Reason* so fascinating and innovative, i.e. the breakthrough towards *critical philosophy*, as well as, from the vantage point of the present, so problematic and ambiguous in nature –, Kant retained the *rationalistic* core of his philosophy in the form of the categories, the terminology and architecture of concept, judgment, and conclusion, reason, synthesis, the transcendental apperception of "*the standing and abiding self*," but most of all by working out the figure of the "synthetic a priori," the basal necessity of which had for the first time been reasoned out with total clarity by Plato, as Hermann Cohen used to emphasize. This, in turn, means that "in the inmost folds" of Kant's doctrine, there is an immovable *rationalistic*, rational core which, ultimately, is the only point for thinking, being always already *in thinking*, to start out from but which "outwardly" or, as Kant sometimes says, at the "lower end," needs to come into contact with the *material* of

[1057] Hermann Cohen, Kommentar zu Immanuel Kant's Kritik der reinen Vernunft, Leipzig 1907, p. 8f.

*sensory perception* even though Kant, as previously quoted, does note that while all cognition begins with "experience," that is, "*sense experience*," its necessity and universality cannot be warranted by the latter alone.

And this ultimately leads to the polar disjunction of the "*extreme ends*" of *sensibility* and *understanding*, or *intuition* and *concept*, which suggests that these are two *equivalent* entities in thinking, such as left and right, or black and red! In the literature on Kant, this is habitually accepted because Kant chose to organize it that way, but *intuition* and *concept* may well mark the starting point and the endpoint of a movement of thought by which the mind comes into its own, they are not *equivalent* entities. For when I "go through" – as Kant likes to put it – the *representations* of the sensibility I am always already *in thinking*, I can't pretend that these representations are of a purely material nature. They may well be based on the sensory stimuli the retina receives "from the outside," they are from the start, as argued above in the chapter on *vision science*, interpretations, or "best guesses," in line with the perceptual patterns of gestalt theory – there is no direct, analogous, linear copying by which sensory stimuli turn into representations of objects, let alone simple ideas, they are not just "*intuition*." In this, and this is my more general objection, Kant, due to his enthusiasm for classical empiricism, underestimates the extent to which our entire perception is, from the start, interpretive, constructed, processed. The "*given*" is always already "*production*," as Hermann Cohen has noted. Cohen is also the commentator who most stringently interpreted Kant in *rationalistic* terms at this point because he always saw himself in a line with Plato's thinking:

"*The erroneous view that thinking, as a unifying act, consists in creating orderings is based on the fundamental prejudice that thinking receives its matter from sensibility and that thinking simply needs to work on this matter. (…) The entire indivisible content of thinking must be a product of thinking. And it is the entire indivisible activity of thinking itself that constitutes the content.*"[1058]

This is why Hermann Cohen's *Logik der reinen Erkenntnis* no longer deals with sensory perception and perceptual psychology at all but "only" with the logic of judgment where thinking in its unity is always already realized. Thus, Hermann Cohen again thinks Kant from the perspective of pure reason, although he dissociates himself from nativism: "*The categories are not innate concepts but the basic forms, the basic orientations, the basic patterns for the formation of judgments*" (loc. cit., p. 43).

It is true that on the strength of the epistemological insight that we can only know what we have ourselves synthetized or constructed, Kant essentially revised and refuted the empiricist "*copy theory*" but, in my view, this *synthesis* starts too late, that is, when too much has already been "*given*"

[1058] Hermann Cohen, Logik der reinen Erkenntnis, Berlin 1902, p. 48f.

before the synthesizing action of the categories can come into effect. And with respect to thinking, Kant, as previously shown, takes care to keep his distance from the fact of *innate knowledge*, preferring to speak of "*natural acquisitions*" so as not to detract from his achievement of ascertaining the categories. At the same time, his no doubt greatest discovery, which is also the one he himself was, quite rightly, most proud of as well as the one he considered to have "*cost [him] the most … effort*," was the deduction of the *categories* from the forms of judgment. A *rationalistic* interpretation of Kant would anchor the a priori in a *dispositionally* nativist way, thus making it quite plausible and consistently placing Kant's achievements in continuation with the line that leads from Plato to Descartes without relinquishing so much as a millimeter of the critical system. The categories are, then, not "*innate concepts*," we all agree on that, but would still be, in Cohen's words, "*the basic forms, the basic orientations, the basic patterns for the formation of judgments*" or, with the term coined by Noam Chomsky for *universal grammar*: the *deep structure*. Now, from the vantage point of the present, it can't be by *coincidence* that these basic forms and basic patterns of thinking are activated in all humans and with necessity, they must be predefined in their basic structures, just as universal grammar is. At any rate, Kant's reliance on the fundamental importance of *synthetic a priori thinking* even in *mathematics* and *geometry* – and notwithstanding the fact, previously discussed, that he links the latter to *intuition* which, however, is not thinking – speaks for the rationalistic perspective. Kant then seeks to bring in line, or integrate into a logically stringent system, all these considerations, motives, perspectives, relations, tensions, structures, and aspects, on the one hand, and keep his distance from both *empiricism* and *rationalism*, on the other. How he does this and what compromises he needs to make in the process is particularly evident in his positioning of the *imagination* and in the way *transcendental deduction* is set forth in the A edition as compared to the B edition of the *Critique of Pure Reason*.[1059]

With this, we are approaching our *second point*, namely a more detailed examination of how the *imagination* ("*Einbildungskraft*") is positioned in Kant's architecture of the *Critique* and why, from the A to the B edition, its functionality and affiliation change from a component that is quite unambiguously associated with *sensibility* to a function of the *higher faculty of thinking*, or the *understanding*. The reason, as I see it, is a change in the strategical orientation of the *Critique*. In his "construction" of the *Critique of Pure Reason*, Kant grapples with the problem of how to link the first of his great discoveries – *transcendental aesthetic*, that is, *space* and

[1059] In this, I will not go into any of the historical comparisons and discussions set forth in, for example, Benno Erdmann, Kant's Kriticismus in der ersten und in der zweiten Auflage der Kritik der reinen Vernunft, Leipzig 1878.

*time* as the intrinsically given forms of perception which, as a consequence, are not abstracted from external things – to his second exploit, the discovery and argumentation of the categories of the understanding. Since he starts out from his self-inflicted commitment to empiricist *sense experience*, he needs to achieve two things at once: do justice to the two "*extreme ends*" of intuition and concept and bring them into contact or, rather, intricate interaction with each other. For concepts can't intuit and intuitions can't think! Now, obviously, there is more than one way of structuring the *Critique*. You can proceed "bottom-up," that is, start out from *sense experience* – sensory impressions, affections, intuitions, etc. – and step-by-step work your way upward to, first, the synthesis of the imagination, then the categories and, finally, judgment, understanding, and reason. But qualify it as you like, this still is the way of thinking traced by Locke for empiricism, with "*sense experience*" as its starting point. Didactically, this way meant that Kant's two great discoveries could only be presented one step after the other. This accounts for the unwieldiness, for non-empiricists, of Kant's argumentation in the A edition, and this is also what left many of Kant's contemporaries and first critics bewildered and prompted Kant himself to write his "Prolegomena."[1060] At the same time, it explains the "predilection" of various commentators for the A edition of the *Critique of Pure Reason* and, more specifically, for its way of setting forth transcendental deduction, whereas the B edition has garnered much less sympathy. For the A edition is still conceived in terms of the empiricist "bottom-up" perspective from "*sense experience*" and, in a certain – i.e. realistic – sense from the "Being," so it is hardly surprising that not only EAN commentators[1061] but also Heidegger and his follower Mörchen as well as certain contemporary authors[1062] prefer to stick to the A edition line of argumentation (also perhaps because there, Kant's reasoning is bolder and simpler and, thus, easier to grasp) and refer to the B edition only in passing.

Actually, the strategically correct way would have been to start out (as in Descartes' *Meditations*) from the unity of the self-conscious thinking, from transcendental apperception, category, concept, judgment, conclusion, idea, but Kant would probably have strongly objected to this because his *philosophy of experience* was supposed to be closely tied to *sense experience* at all times and not get lost in "*deceptions*" (CPR, B 823)

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1060 Cf. Georg Mohr, Immanuel Kant, Theoretische Philosophie, Frankfurt / Main 2004, p. 516–520.

1061 E.g. Robert P. Wolff, Kant's Theory of Mental Activity, Harvard College Gloucester 1973.

1062 Matthias Wunsch, Einbildungskraft und Erfahrung bei Kant, De Gruyter Berlin/ New York 2007; Karl Hepfer, Die Form der Erkenntnis – Immanuel Kants theoretische Einbildungskraft, München 2006.

and conceptual pipe dreams. Also, both build-ups – whether bottom-up from *sense experience* to understanding or top-down from understanding to *sense experience* – come with their own sort of problems: the bottom-up way with inconsistencies and the permanent question of where the investigation is heading, the top-down way with the need for auxiliary didactic constructions and over-complexity. In purely didactical terms, getting to the heart of Kant's doctrine – *transcendental deduction* – is probably easier when one adheres to the flawed empiricist theory of perception and starts out from the "lower end," i.e. *sense experience*. And so, Kant commits the seemingly natural but, from the point of view of *rationalism*, fundamental error of starting out from the "exterior" or, rather, the "lower end," i.e. *sense experience*, *sensory perception*. Unlike *Descartes* who first sought to "cleanse" himself of any disruptive prejudices, exterior influences, and the occasional illusions of the fallacious senses and, in thinking, proceeded to the *cogito* as the very headstone from which to rebuild the world of his thinking, Kant, due to his adherence to John Locke and the empiricists, builds his system on *immediate intuition*, *sensibility*. This may well have been Kant's way of opposing the *dogmatism* of the *rationalists* of his time, but the label of *dogmatism* can surely not be meant to apply to Descartes. For, as Wolfgang Carl specifies:

"*A position is dogmatic if it deals with philosophical ideas 'without first inquiring in what way and by what right it has obtained them' – 'the dogmatic procedure of pure reason without an antecedent critique of its own capacity' (B XXXV)*."[1063]

But with the cogito, the self-consciousness of the mind, Descartes had not only established the anchor point for all of modern philosophy, and doubtlessly also for Kant, he had set the course for what is arguably the most fundamental type of self-doubt and offered a thoroughgoing elucidation of the possibility of all cognition, more particularly with respect to the bounded nature of sensory perception and the gaining of *certainty* by reason, i.e. the *natural light*. As the founder of modern doubt, he surely is the very last person to be charged with a lack of self-critical thinking, i.e. "dogmatism"! In contrast to Kant, Descartes (as previously discussed) had realized as early as in his *Optics* that any *intuition* of objects is already subjected to an ongoing process where the immediate sensory perceptions are corrected with respect to *size and shape constancy* and is, therefore, anything but mere "*receptivity*" (CPR, B 33) or a simple copying mechanism. As the Marburg neo-Kantians, in particular, rediscovered, Kant is actually much closer and much more indebted to Descartes than he is conscious of, or cares to acknowledge. This is, after all, the very reason why Neo-Kantianism should much more strongly own up to its *rational-*

[1063] Wolfgang Carl, Die Transzendentale Deduktion der Kategorien, Frankfurt/M. 1992, p. 87.

*istic* roots, rather than try to pander to the current EAN fashion. Hermann Cohen's *Logik der reinen Erkenntnis*, already cited, is an example of this partial course correction, its focus being on the forms and gestalts of *judgment* rather than "*sense experience.*" Cohen's résumé: "*The logic of judgment has established itself as the logic of idealism*."[1064]

That the concessions to empiricism made from the start by Kant in the *Critique of Pure Reason* are too far-reaching is not only apparent, as previously noted, in the symbolical dedication to Bacon, it even comes to be expressed in the very first lines of the *Critique* itself:

"*In whatever way and through whatever means a cognition may relate to objects, that through which it relates immediately to them, and at which all thought as a means is directed as an end, is intuition. This, however, takes place only insofar as the object is given to us; but this, in turn, is possible only if it affects the mind in a certain way.*" (CPR, B 33)

So, there's no denying that Kant starts his monumental enterprise of setting forth and exploring the bounds of pure reason, of clarifying how *synthetic a priori judgments* are possible at all, with – *intuition* (bold in the original) and the *given*, as well as with a statement that what is at issue is the cognition of *objects*, "*at which all* (!) *thought as a means is directed as an end*;" which, if true, would be a shame. Intuitions, the sensory impressions "*that affect the mind*," are supposed to mark the point where reason begins. But true to the empiricist way, the *object* must – in Kant's own words – be "*given to us*" although at this stage of immediate intuition, as we have shown in the chapter on *vision science*, it is quite impossible for us to have productively isolated it in the "manifold" of the *field of vision*, let alone represented it figuratively, which means that in truth, we can know nothing whatsoever about it as an object. This introductory example already shows that from the very first line Kant's epistemology, contaminated as it is by empiricist ideas, takes a wrong turn. Nor is the A edition much better in this respect since it states that the understanding "*works on the raw material of sensible sensations*" (CPR, A 1). That the understanding, the "*cognitive faculty*," is set to work on the "*raw material of sensible sensations*" at such an early stage is already a rather surprising step. But there is a further complication, namely that fact that Kant's deeper, *rationalistic* question had initially been: "*How are synthetic a priori judgments possible?*" – and not only in mathematics and geometry. Taken one step further, the logic of this question leads to the deeper one of how *synthesis* is possible at all, that is, *how* intuitions, representations, and concepts can, in thinking, be blended so that judgments can be formed and conclusions be drawn, and *how*, first of all, this blending happens in such a way that the results obtained in accord with fixed rules and laws are

[1064] Hermann Cohen, Logik der reinen Erkenntnis, Berlin 1902, p. 507.

meaningful and true. This *a priori synthesis*, that is, the connective process where the logical and the intuitive are systematically and correctly blended into each other, i.e. where thinking "happens," is one of the two key topics of the *Critique*, the other one being the elucidation of the bounds of understanding and reason, regarding which, as Kant explains in the Introduction to the A edition, "… *the chief question always remains: 'What and how much can understanding and reason cognize free of all experience?'*" (CPR, A XVII). For Kant, these are the "*two sides*" of his "*inquiry*," described as the *objective* and the *subjective* side. Dieter Henrich characterizes them as follows:

"*The objective side explains the validity of the categories, the subjective side examines the interconnectedness of our cognitive faculties, which must be assumed if these categories are to be applied*."[1065]

So, while objective deduction shows *that* the categories are valid, subjective deduction must show *how* this is to be accomplished. As a result, there is a certain overlap between the two "perspectives" – *bottom-up* and *top-down* – and the two approaches – *subjective* and *objective* –, which is why I refer to it here, for the final result is, after all, supposed to confirm the *objective* validity of synthetic a priori judgments as well as demonstrate the various intermediate faculties, transformations, and functions that are involved in the process, and explain *how* all this is supposed to happen in the subject. The approach by *sense experience* therefore serves to show the *HOW*, the subjective process; also, it begins at the "*lower end*" and, thus, reinforces the "suspicion of empiricism." For even if Kant, in the "*Critique*," dissociates himself from the outset from empiricism by at once positioning experience as a *product* of the understanding, as Kurt Walter Zeidler quite rightly notes,[1066] the fact remains that the *Critique of Pure Reason*, just as Locke's *Essay*, begins with *sense experience.*

Dieter Henrich describes Kant's "bottom-up" procedure as follows:

"*What he has in mind is a hierarchy of the cognitive faculties where the understanding marks the highest and sensibility the lowest level – the extremes between which the imagination makes the connection of possible attribution, and between which the two modes of proof proceed in opposite directions*." (loc. cit., p. 92)

So, for the overall construction of the *Critique of Pure Reason*, and unlike what he did for the deduction of his categories where he relied on it as the second way, Kant decided against the alternative of starting out from the

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1065 Dieter Henrich, Die Beweisstruktur von Kants transzendentaler Deduktion, in: Gerold Prauss (ed.), Kant – Zur Deutung seiner Theorie von Erkennen und Handeln, Köln 1973, p. 91.

1066 Kurt Walter Zeidler, Grundriß der transzendentalen Logik, Cuxhaven & Dartford 1997, p. 19.

"*headstone*," i.e. the *synthetic unity of apperception*, and reconstructing the nature of our perception and our construction of reality "top-down" from this synoptic self-conscious *unity* and its *forms* of thinking; which was Descartes' way in the *Meditations* where he makes sure that certainty is gained, first with respect to his own thinking, then to his body and, then, to the external world. In *both* the A and the B edition of the *Critique of Pure Reason*, therefore, the "progression" begins at the "lower end" because, as previously noted, Kant put his trust in the fallacious "*sense experience*" of empiricism and established it as the supposedly solid ground on which to construct the edifice of reason. So, he may have built his architectonic masterpiece on precisely this fallacious quick-sand of empiricist *sense experience*, the fundamental problem of which we have already examined in the preceding chapters.

Meanwhile, in the *Prolegomena* (1783), Kant chooses yet another, fundamentally different approach by distinguishing between *judgments of perception* (this raspberry ice is more to my taste) and *judgments of experience* (this stone is bigger), with the former being subjective and only the latter warranting universality and necessity. The *imagination*, that is, the very function that is charged with bringing together our a priori existing categories and the sensory impressions from the outside world, is hardly mentioned at all, in contrast to the *Critique* where it plays a central if multifaceted and, in terms of function and affiliation, even partly contradictory role. This is also highlighted by Matthias Wunsch: "*In the Prolegomena, the imagination is not explicitly referred to either at the beginning or in the course of the analysis of experience.*"[1067] For whatever path we choose in the *Critique*, bottom-up from the "*lower end*" or top-down from the "*headstone*," there always is a point where *synthesis*, the *blending*, the *transformation* of intuition and concept into one another must happen. According to the B account (§ 24), however, we need to distinguish between two forms of *synthesis*: firstly, the synthesis which generates structured "images" from the singular, scattered *intuitions* of a *manifoldness* – which is what Kant calls "*figurative synthesis*" (*synthesis speciosa*); secondly, the synthesis which Kant calls a "*combination of the understanding*," or *synthesis intellectualis*, "*which would be thought in the mere category in regard to the manifold of an intuition*" (CPR, B 151). This *intellectual synthesis*, being accomplished "*without any imagination merely through the understanding*," is distinct from the *figurative* one (CPR, B 152). However, without wanting to anticipate, Kant does not go any further into this "*intellectual synthesis without any imagination merely through the understanding*," nor does he elaborate on the distinction, or divide, between the two forms of synthesis, one of which is brought about by the *imagination* while the

[1067] Matthias Wunsch, Einbildungskraft und Erfahrung bei Kant, De Gruyter Berlin/New York 2007, p. 268.

other is supposed to belong to pure understanding. So, according to the B edition's revised and more reflective version of transcendental deduction, we are supposed to have *two* types of synthesis: the *productive imagination* of the *figurative synthesis* which, as the first of the connective powers (always from the "bottom-up" perspective, i.e. from sense experience), "prepares" structured images and "figurative" representations from the individual, scattered *intuitions* and conditions them so that they become capable of being processed by the categories and concepts in the *intellectual synthesis*.

This *productive synthesis* of the *imagination – figurative synthesis* – thus becomes the centerpiece of this transformational process where individual sensory phenomena move towards general concepts or, inversely, individual concepts move towards the *intuitions* that will make them "intuitively accessible." Regardless of the perspective from which one considers these transformations, "bottom-up" or "top-down," this *figurative synthesis* is the work of the *imagination*, a *third* faculty that Kant positions between the two "*extreme ends*," the "lower end" and the "headstone," since otherwise, cognition would not be possible for us at all. With respect to *transcendental deduction*, these two perspectives have been accounted for in various ways by various authors. In "*Einbildungskraft und Erfahrung bei Kant*," Matthias Wunsch, seeking to come to an adequate description of the position of the *imagination* in *transcendental deduction*, proposes a meticulous analysis of both "*bottom-up deduction*" (CPR, A 119/125) and "*top-down deduction*" (CPR, A 115/119). However, his in-depth investigation is exclusively based on the *A deduction*, which allows him to offer a more detailed account of the individual faculties and functions of the imagination but, of course, leaves open a number of questions since the B edition is, after all, the final version authorized by Kant himself. Wolfgang Carl, in turn, dedicates an entire section of his study "*Die transzendentale Deduktion der Kategorien*" to the "*top-down*" *A deduction*, arguing that "'*top-down' deduction* [is] *the most conclusive form for carrying out a 'deduction of the categories,*'"[1068] but does not specifically discuss "bottom-up" deduction at all. And Sarah Gibbons who, in her very clear and lucid study "*Kant's Theory of Imagination*," looks at both deductions primarily from the perspective of *synthesis* and offers an easy-to-understand discussion of the differences between the A and the B deduction, argues as follows:

"*To use his phrase in the A edition, the first step of the B Deduction starts* 'from the top' (my emphasis), *namely, with the (synthetic) unity necessary to thought of an*

[1068] Wolfgang Carl, Die Transzendentale Deduktion der Kategorien, Frankfurt/M. 1992, p. 95ff.

*object abstracted from the conditions under which the intuition of that object is given to human beings.*"[1069]

Sarah Gibbons also quite rightly notes that the different ways of accounting for and positioning the *imagination* follow from the different "perspectives" on transcendental deduction, or, rather, the overall architectonic of the *Critique*! In the A edition, due to his commitment to his empiricist predecessors, Kant places great emphasis on starting out "*from the lower end*," i.e. sensible experience or intuition, whereas in the B edition, he refocuses on his rationalistic and idealist roots and starts out "*from the top*," i.e. the *synthetic unity of apperception*, which, as a logical consequence, also changes the role and the position of the *imagination*. Since the latter is the *faculty* that accomplishes the *synthesis*, i.e. the basic operation of processing the figurative representation that makes conceptual thinking at all possible, it can, from the "top-down" B edition perspective, no longer pertain or be left to *sensibility*. The *imagination* is repositioned within the *understanding* by Kant, and *sensibility* loses in independent operative importance. This, in turn, raises the well-known question: "What remains of sensibility?" Since *sensibility* is, by its very nature, *passive* and "*receptive*," it cannot be a determining, differentiating, connecting, synthesizing, etc. agent, or function, in its own right. Sarah Gibbons also comments on these different approaches:

"*In general, we might say that the A edition tends to build up the object of knowledge from the elements of sensible experience, while the B edition begins by abstracting from that experience, in order to characterize thought about objects in general, subsequently to fill in the conditions of sensible experience which such thought must meet.*" (loc. cit., p. 51f.)

I fully agree with Sarah Gibbons but nevertheless believe that the difference between the approaches of the A and the B edition of the *Critique of Pure Reason* is decisive not only for the chapter on deduction but for the *Critique* in general. In my view, Kant's reversal of orientation in the B edition is due to an underlying strategic correction, or re-thinking, in terms of *rationalism*. Obviously, over time, he found it more reasonable to return to his original view that while *intuition* and *concept* may, at best, nominally mark the two "*extreme ends*" of the cognitive process, they can never be two equivalent domains of thinking, and that since thinking can, in thinking and its thoughts, always only be in thinking, it must start out from its inherent basic structures – which, after all, is the root idea of *rationalism*. The *concept* is the expression of this faculty of synthesizing, consolidating, the "*manifold*" of sensory impressions into a unit whereas,

[1069] Sarah Gibbons, Kant's Theory of Imagination, Clarendon Press Oxford 2002, p. 40.

as I have tried to explain in detail when discussing Locke's philosophy, there is no way for concepts, let alone abstract ones, to be obtained by any direct copying of the "*manifold*" of sensory impressions.

With the *imagination*, Kant positioned a *faculty* or, in more philosophically adequate terms, a *function* at a central point of his system, which plays a crucial role in more than one respect: it is not only supposed to effect the *blending* of the extremes of *sensibility* and *understanding* and to directly accomplish the *act of synthesis* by transforming something *sensitive-figurative* into something *conceptual-linguistic*, it is also credited with a number of further capacities, depending on the point of view, or the perspective, actually chosen by Kant. In Kant's conception, these capacities of the *imagination* include the capacity to generate – in Kant's own words – "*images*," productively configure objects in the field of vision, construct them by "*a hidden art in the depths of the human soul*" from the many different gazes, views, perspectives, represent and remember them and make them, by a "monogram-like" representation, *thinkable* and at the same time – depending on the "perspective" – *intuitively accessible*. Furthermore, the imagination is capable of figuratively representing objects *in their absence* (which implies that already at this level, they are imagined in their totality!), of remembering them figuratively and combining traces of images from different perspectives and moments. Since the crucial step of the image-to-concept transformation by *schematism* is only vaguely described as an unknown procedure in the "*depths of the human soul*," while "*the schema is in itself always only a product of the imagination*" (CPR, B 179), this internal process of synthesis is, of course, more or less shrouded in darkness. Basically, it is the central function that is supposed to elucidate the large territory where, in Locke, there is nothing but a vast blank area on the map of empiricist philosophy, extending between the *simple ideas* which we simply copy and pluck, and the abstract concepts these simple ideas are supposed to directly lead to, scantily identified by a paper slip that says "language." So much for this rather complex introduction, following which we will now proceed to the examination of the role of *imagination* and *schematism* in the *Critique of Pure Reason*, which may even result in a better and more logical ordering of the faculties once *visual thinking* finds its place in the transition from *intuition* to *imagination* to *understanding*, namely the very point that marks the growing-together of *seeing* and *thinking*.

## The imagination in Kant: its position and function

A survey of Kant's observations, descriptions, and definitions concerning the imagination throughout his work yields a rather variegated, or at least varying, impression of its purpose, attribution, and functions as well as its

position and logical linkages in the critical architectonic: in the first edition of the *Critique* (1781), Kant's positioning of the *imagination* and its function suggest a *bottom-up* progress from the processing and conditioning of *sense experience* to the "*top*," i.e. the *synthetic unity of apperception*, while in the revised and reconsidered B edition of the *Critique* (1787), he definitely positions it as functionally associated with the upper faculties. Its functionality is now conceived *top-down*, the *imagination* has become an agent of the understanding that "*acts*" on the sensibility and conditions it so that the understanding, as the rational element of the process, can deal with its products by *conceptual* thinking. This is remarkable, and one of the most fundamental changes from the first to the second edition of the *Critique of Pure Reason*. By its very nature, the evident change of the overall *perspective* means that the role of the *imagination* also changes in various ways from an "image-processing" or "image-editing" function to the *key enabler of synthesis*, lacking which the understanding, exclusively capable of conceptual thinking, and for all its intelligence, would be unable to access the continual inflow of sensory impressions at all.

It seems that over time, not least due to various objections, among them the one raised by one of his students, Sigismund Beck, "*that the construction of the book favors a wrong assessment of Kant's doctrine*," Kant had indeed begun to rethink its position. Kant died before he could agree to a restructuring of the *Critique*, but he was by no means beyond envisaging it. "*In a letter to Beck's colleague Tieftrunk, he tried to show what form the Critique might assume with a different presentation*."[1070] Any change in *perspective* logically entails a significant change in particular in the position and functionality of the *imagination*. This indecision in the description and positioning of the *imagination* in Kant's writings has not gone unnoticed by friend and foe alike. As for me, I would like to make it clear right away that in line with Kant, I do not conceive of this discussion as a psychological analysis of the efficiency of the human *faculties* but as deduction in the original Kantian meaning, that is, as the transcendental functions of the logical-deductive procedure of proof by which, based on the categories, the rule of reason is to be substantiated. It goes without saying that this self-assurance of reason can only be effective when its starting point is thinking, the rational, rather than *sense experience* which, if only because of the "*inverse problem*" pointed out by *vision science*, must be understood as an infinitely undetermined *manifoldness*. Still, along with the transcendental-logical facts, any description of the efficiency and the structure of the cognitive process needs to account for certain concrete *anthropological* conditions, as Kant indeed, if implicitly,

[1070] Dieter Henrich, Die Beweisstruktur von Kants transzendentaler Deduktion, in: Gerold Prauss (ed.) Kant – Zur Deutung seiner Theorie von Erkennen und Handeln, Köln 1973, p. 95.

did. For human beings use their eyes for visual perception and not, like the much-invoked bat, ultrasonic echolocation, or, even more extreme – just a little thought experiment -, X-rays.

This is why any description of an "image processing" agent such as the *imagination* will always also have to consider certain anthropological, biological, and physical conditions of man even if the respective study is only concerned with its *transcendental-logical function*. Far from detracting from the freedom, rationality, and spontaneity of the mind, this only adds to the strength of the analysis in question. Kant's first-ever elucidation of the transcendental mode of cognition was a "Copernican revolution" in its own right. At the same time, we have to make allowances for the fact that there was no way for him to understand the highly complex *active* conditioning of *vision* in its full functionality as we do today. As a result, the description of the *imagination* is bound to vary over time, and we are never quite sure whether he still starts out, at a given point, from *intuition* as an immediate sensory impression or already conceives of it in terms of concrete *figurative representations*; which is why the term of *intuition* remains more or less ambivalent in Kant. At the beginning of the Transcendental Aesthetic, for instance, the nature of *intuition* is defined as follows:

"*In whatever way and through whatever means a cognition may relate to objects, that through which it relates immediately to them, and at which all thought as a means is directed as an end, is intuition. This, however, takes place only insofar as the object is given to us; but this, in turn, is possible only if it affects the mind in a certain way. The capacity (receptivity) to acquire representations through the way in which we are affected by objects is called sensibility. Objects are therefore given to us by means of sensibility, and it alone affords us intuitions; but they are thought through the understanding, and from it arise concepts. But all thought … must ultimately be related to intuitions, thus, in our case, to sensibility since there is no other way in which objects can be given to us.*" (CPR, B 33)

Furthermore, there is Kant's well-known subdivision of direct *intuition* into *empirical* intuition which takes in the empirical "*material*" and *pure* intuition which always already applies the forms of time and three-dimensional space to the empirical material it receives, thus organizing it for us. This means that Kant, just as Descartes before him (who, after all, was the first to understand object and size constancy in vision as a form-giving action of the mind – see also Richard Gregory's previously quoted appreciative note to this effect), realizes that the empirically received impressions can never suffice for us to gain structured knowledge of the world (poverty-of-the-input problem). In this sense, Kant's Transcendental Aesthetic is his first masterstroke. However, it also comes with a number of ambiguities, primarily from a latter-day perspective of *vision science*, so to a certain degree, Kant here treads on treacherous ground. He

first notes that "*objects are … given to us by means of sensibility, and it alone affords us intuitions*." This implies – even though he is rather vague as to the mode of *how* the object is perceived, just stating that "*it affects the mind in a certain way*" – that in *intuition*, cognition relates *directly* (!) to the object. Now we already know – and Kant himself has taken great care to describe just this –, that what we first dispose of in vision is nothing but a totally undetermined "field" which (as explained in the respective chapter) is subjected to a highly comprehensive and complex initial structuring and organization in accord with the laws of *gestalt theory* (and not only in the forms of space and time!) *BEFORE* there are any *objects* for us to bring under concepts. These objects first need to be generated by an interpretation of shadows, contrasts, surfaces, edges, experiences – they are never *directly* accessed! At a later point in the Transcendental Aesthetic Kant, however, comprehensively describes how the *imagination* works on the – still raw and confused – *manifold of the intuition* to achieve *synthesis* by "going through" the images and organizing the many figurative impressions in a way that allows us to interpret, structure, and organize, say, the town in the distance, or the room "*piled high with pictures and decorations*," and, thus, to understand it, in the first place. Only after this synthesis can we speak of *objects* at all since before this organizing intervention, there is only the kaleidoscopic chaos of the manifold of the field of vision.

In my view, it is obviously wrong to say that *objects are given* to us by nothing but the *passive-receptive* capacities of the mind. What, if anything, is "given" to us is a field of vision that is initially completely undetermined – that's all there is. It takes the *active* capacities of our cognition to sort out what, in all this, will become, or be processed to become, something to be "taken," nothing is ever *directly* given to us, everything is always, as Kant quite rightly sees, worked out of this *manifold* in a multistage process of *forming*, or *synthesizing*, that first creates it as an *object* at all. Only then can the conceptual synthesis of apperception, the understanding, be "added" (CPR, A 124). So, in this sense, even though Kant's understanding of the visual processes and functions as set forth in the *Critique* may be in need of some correction, the broad lines of his concept of "image-processing" and the *synthesis* of the *manifold* are quite correct and defensible. However, it is this very indecision described above and the occasionally contradictory characterizations of the *imagination* which suggest that until the last, Kant was more or less conscious of it as a domain of the *Critique* that was still vague and not fully understood. This may be an important indicator of *visual thinking* as the "missing link" in Kant's architectonic!

## EAN's misguided criticism of Kant's conception of the imagination

Before proceeding to my examination of what *imagination* in Kant signifies at various stages of his thinking, let me briefly discuss the criticism of Kant's conception of the imagination leveled by Peter Strawson, a prominent EAN exponent, in his much-cited work *The Bounds of Sense* as well as his later essay "*Imagination and Perception*." As for another major line of criticism, namely that of Martin Heidegger in "*Kant und das Problem der Metaphysik*," or Hermann Mörchen in "*Die Einbildungskraft bei Kant*," I will not discuss it here because this would push the boundaries of the present study and because actually, with the decline of existential philosophy, their criticism has by now lost most of its relevance whereas the controversy with EAN remains topical and momentous. In principle, Strawson's entire criticism is essentially based on the flawed and naïve epistemological EAN model, primarily in the version offered by Hume, which was not only in high regard when *Bounds of Sense* was first published but, in addition, tended to fraternize with *behaviorism*, today obsolete. Since, as described in detail in the chapter on *vision science*, it was not until around 1980 and the first computer models of *vision* that a first tentative change of thinking set in in Anglo-American philosophy, Strawson may still have been steeped in the EAN delusions of grandeur, thus treating Kant in the arrogant as well as condescending way that had become the fashion since Gilbert Ryle. So, in his much-quoted work *The Bounds of Sense*, Strawson already felt free to gloss over the entire complex of synthesis in general, and the imagination in particular, and to specify his own method of analyzing *transcendental deduction* as follows:

"*I shall not try to penetrate to every point of this jungle; rather to hover over it long enough to note its principal features.*"[1071]

Having briefly touched upon the role of the imagination in one passage, he comes to his conclusive résumé of the chapter on deduction:

"*It is useless to puzzle over the status of these propositions.*" (loc. cit., p. 97)

In the chapter "*Strawsons Ausgrenzung der Einbildungskraft*" of his book "*Einbildungskraft und Erfahrung bei Kant*," Matthias Wunsch offers a detailed discussion of Strawson's arguments. To this end, he organizes Strawson's objections into three main arguments: an *irreality objection*, a *constitution-theory objection*, and an *incoherence objection*. Basically, all three objections can, in turn, be reduced to the fact that Strawson had never fully understood the structure and real core of Kant's epistemology because, as previously stated, his access to this understanding was blocked

[1071] Peter Strawson, The Bounds of Sense, An essay on Kant's Critique of Pure Reason, Routledge, London/New York 2007, p. 93.

by his adherence to Locke's and Hume's theory of the *image-like copying of objects*. But let's first follow Matthias Wunsch's analysis. Thus, there is the *irreality objection* which, incidentally, we are already well acquainted with, namely in the form of the propagandistic EAN rumor that Kant's philosophy, dealing as it does with representations, mental processes, and faculties, might well hold for the world of *phenomena* but lacked any connection whatsoever with the world of real things and, from the viewpoint of realism, was therefore irrelevant – "*For Strawson, 'phenomenon' is the opposite of 'reality'*"[1072] – as well as a major example of a form of phenomenological idealism that failed to really relate to the natural world. This wrongly insinuates, as comprehensively explained in the first part of this study, that idealism was jettisoning "reality."

The *constitution-theory objection*, then, is closely linked to the *irreality objection* since it finds fault with the fact that objects are not *directly* accessible to us and that we cannot perceive sensory impressions unless they have been spatially and temporally organized, and cannot conceptually determine objects unless they have been figuratively synthesized, for a uniform consciousness, from the *manifold*, i.e. the – roughly speaking – unprocessed field of vision. Here again Strawson, trained to think along the lines of Locke's and Hume's model, was unable to understand Kant's doctrine because he obviously believed in a *direct* cognition of *reality*. Last but not least, there is the *incoherence objection* that targets Kant's doctrine of synthesis and, thus, imagination because according to Strawson, there is no empirical evidence for these functions. Whoever has read the above chapter on *vision science* will have no trouble seeing that, quite on the contrary, what is misguided here is Strawson's general view, oriented as it is to the EAN "copy thesis" and its belief in a *direct* access to reality, while Kant's doctrine of the *synthesis of the manifold*, of *productive*, *figurative synthesis*, that is, the processing and construing of sensory perceptions, is indeed fully consistent with the findings of modern *vision science*. In my view, Matthias Wunsch has provided a conclusive refutation of Strawson's objections, while *The Bounds of Sense* as such falls so drastically short of the standard of the *Critique of Pure Reason* that there seems to be no point in going into it any further here.

Let's now turn to Strawson's essay "*Imagination and Perception*," for it allows us to follow his argumentation more concretely and to realize, in the process, that he wasn't even aware of Kant's basic problem, the difficulty arising from the fact that the *manifold* needs to be processed. Strawson seems to not understand at all *why*, with respect to this *manifold*, the role of *imagination* and *synthesis* is so essential in the cognitive process:

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[1072] Peter Strawson, The Bounds of Sense, An essay on Kant's Critique of Pure Reason, Routledge, London/New York 2007, p. 93.

"*My primary topic is Kant´s use of the term 'imagination', in the* Critique of Pure Reason*, in connection with perceptual recognition – a use which may appear something of an outsider, but nevertheless has claims to affinity which are worth considering.*"[1073]

Even in this specific examination of what *imagination* may mean in Kant, Strawson does not discuss any of the many references to the imagination in Kant's other works but confines himself to quotations from parts of the *Critique of Pure Reason*, for instance, the "Refutation of Idealism," which are not really those one would choose as an adequate starting point for a genuine clarification of the function of the *imagination*, in particular in the context of transcendental deduction. Unsurprisingly, Strawson, on the other hand, extensively consults Hume and Wittgenstein, with Hume's mode of perception, as previously explained, consisting of an "inner film" with an integrated copy function and Strawson's reference to Wittgenstein focusing on the latter's fragmentary reflections on "*seeing as …*," also previously discussed. The function, discovered by Kant, of a *productive imagination* that synthesizes the *manifold* of perception, thus organizing and creating it for us as the image we perceive as a representation, in the first place, is completely ignored. *Imagination*, therefore, is always conceived of by Strawson as the *ready-made image* of an object, whether present or absent, with the result that he is, of course, unable to see what might be its "use" in Kant, i.e. its genuinely synthesizing function. Again, the typical empiricist *mechanism of self-delusion* takes effect. If one isn't even aware of synthesis as the crucial act in the process of perception and, therefore, starts out from a *naïve realism* where finished and apparently one-hundred-percent directly copied image-objects only need to have their proper names affixed to them, then one is of course unable to see the point of Kant's complicated reconstruction effort. Strawson, one of the great Kant experts in Anglo-American philosophy, then goes on to offer a practical example of his consummate art of thinking:

"*Suppose, for example, that I notice a strange dog in the garden, and observe its movements for a while; and perhaps also notice, a few minutes later, that it is still there. We should not ordinarily say that this account of a small and uninteresting part of my history included the report of any exercise of the imagination on my part. Yet, in Kant´s apparently technical use of the term, any adequate analysis of such a situation would accord a central role to imagination, or to some faculty entitled 'imagination'.*" (loc. cit., p. 83)

What is, first of all, apparent here is again the use of the terms *notice*, *observe*, and, once more, *notice* rather than *recognize* (by thinking). This is

[1073] Peter F. Strawson, Imagination and Perception (1971), in: Ralph C.S. Walker (Ed.), Kant on Pure Reason, Oxford University Press, Oxford New York 2004, p. 82.

typical of the recurrent "self-denial" of thinking in EAN, and primarily since Hume. Things would be quite different if Strawson, rather than *observe* something he already knows, in this case a dog where the *concept* always already includes the rule for recognizing it, would have taken a look through the microscope at, for instance, the histological tissue section of a stomach cancer or some bone marrow (to cite a well-known example), in which case, apart from structures, dots, forms of different colors, he would have noticed or, rather, recognized – nothing! Since in Strawson's entire essay, but also in *The Bounds of Reason*, there is not a single reference to the *manifold*, that is, not a shred of the essential realization that all we have to start out from is an undifferentiated field of vision which first of all needs to be spatially organized so that objects can be *figuratively* formed from it by the workings of *productive imagination*, we can indeed assume that he did not understand Kant's approach at all and really believes that he can *directly* copy an object as such; which, in turn, implies that he has not even taken into consideration, let alone understood, the function of *productive imagination* or *figurative synthesis*. This is clearly evident from the following passage: its phrasing, typical of analytic linguistic philosophy, has all the appearances of cogency but its content is nevertheless, for the reasons stated above, completely misleading:

"*The thought of something as an x or as a particular of x is alive in the perception of it as an x or as a particular x just as the thought of an x or particular x is alive in the having of an image of an x or a particular x. This is now sometimes expressed in speaking of the intentionality of perception, as of imaging. But the idea is older than this application of that terminology, for the idea is in Kant.*" (loc. cit., p. 97)

It is quite obvious that in Strawson's way of thinking, an *object* is always already implicitly perceived as a ready-made x or, rather, projected in the form of an inner "film" of x, and all that remains to do is affix a name to it. Not for a moment does he suspect that at all at this level of perception objects must first be figuratively worked out of the *manifold* of the field of vision before they can be identified at all and that, inversely, the knowledge that is needed to recognize the respective object is always already "congealed" in and supplied by the *concept*. Therefore, he "*notices*" the dog in the garden as a ready-made and fully recognizable x because in the EAN copying-mode thinking, there simply is no such thing as a "condensing" process. So, let's take a closer look at Kant's concept of the *manifold*, for it would seem that this is where we will find the explanation why, from a perspective of transcendental logic, *synthesis* by means of the *productive imagination* is simply indispensable (Thomas Wunsch, too, highlights the *manifold* and *synthesis* as the key concepts that are essential for invalidating Strawson's objections). In CPR, B 104, Kant clearly indicates that the cognitive process must begin at the "lower level" and how the

*three* steps must happen to enable the cognition of objects in our imagination:

"*The first thing that must be given to us a priori for the cognition of all objects is the manifold of pure intuition; the synthesis of this manifold by means of the imagination is the second thing, but it still does not yield cognition. The concepts that give this pure synthesis unity … are the third thing necessary for cognition of an object that comes before us, and they depend on the understanding*."

Unless one seeks to deliberately complicate things, this is what Kant unequivocally says here: in the cognitive process, there are *three* elementary steps, or stages (which, in turn, can be differentiated into sub-steps). Firstly, our *senses* are "affected" by the outside world; here, I propose to use the more general term of *field of vision* for these impressions (with different terms, of course, for hearing or the other senses!) because speaking of *objects* at this stage (which, regrettably, Kant occasionally does, as previously discussed) would encourage the common illusion that at this "level zero" of perception, we can already understand and determine things. Actually, what the consciousness disposes of at this stage is only the totally undetermined *field of vision* even though, as Kant has shown in the *Transcendental Aesthetic*, the latter is always already spatio-temporally organized. This is what Kant calls "*the manifold*." So, since this is a pivotal term – how, concretely, are we to conceive of it? In his "*Lectures on Metaphysics*" Kant explains:

"*My mind is always busy with forming the image of the manifold while it goes through [it]. E.g., when I see a city, the mind then forms an image of the object which it has before it while it runs through the manifold. Therefore if a human being comes into a room which is piled high with pictures and decorations, then he can make no image of it, because his mind cannot run through the manifold. It does not know from which end it should begin in order to illustrate the object*."[1074]

This condition is not unlike William James' "*buzzing blooming confusion*" of direct sensory perception where no organizing principle of whatever kind has as yet intervened. For objects to be formed, this kaleidoscopically undetermined field of vision needs to be organized which, under normal circumstances, happens more or less automatically. But actually, as we have already seen in our overview of *vision science*, this seemingly trivial achievement takes up almost half of our total cognitive capacity. Nor is it trivial at all, as it was brought home with a vengeance to the computer scientists working in *vision science*. Also, when faced with an unfamiliar view (such as Kant's room "*piled high with pictures and decorations*"), our cognition may well be overcharged, thus offering a unique opportunity

[1074] Immanuel Kant, Metaphysik $L_1$, in: Immanuel Kant, Lectures on Metaphysics, Cambridge University Press 1997, p. 54.

for us to become aware of this unbelievable achievement. So, as Kant was the first to realize, this "*swarm of appearances*" needs to be structured, and this is the very idea which, as a further consequence, will necessarily lead on to synthesis if, in the end, all of this is supposed to be grasped, in a reasoned way, by a unified I. This is the point that EAN keeps ignoring, as does Strawson when he assumes ready-made images such as the dog he simply "*notices*" in the garden.

However, even Kant underestimates the complexity and depth of this problem, for his example of a room "*piled high with pictures and decorations*" suggests that certain objects, or elements, of this "image" (such as "*pictures and decorations*") are already known to us and that all that remains for the mind to do is to "*go through*" these preformed representations. This, however, implies – and this will be the starting point for my subsequent argumentation – an underappreciation of the actual interpretation and construction work of the "mind," for the initial field of vision is quite undetermined and does not primarily contain any known elements at all (as modern *vision science* has been at pains to realize). But the greater the number of *known elements* in the field of vision, the more "natural" the illusion that we are able to recognize things *directly* and *immediately*, and the smaller the number of these elements, the sooner we will become aware of the necessity of active structuration and *figurative synthesis* by means of *productive imagination*. Therefore, I once more insist on this even at the risk of being obtrusive because Kant, too, makes a wrong assumption at this point, which will later become decisive:

"*This illustrative faculty is the formative faculty of intuition. The mind must undertake many observations in order to illustrate an object so that it illustrates the object differently from each side. ... The mind must make an illustration from all these appearances by taking them all together.*" (loc. cit.)

Evidently, Kant has very thoroughly reflected on these issues, for he indeed realizes that a single gaze, a snapshot as it were, does not suffice for us to be able to correctly visualize an unfamiliar animal, a blood smear, a building, in all its structures and dimensions but that, actually, we first need to *form*, in time, an adequate representation of the object based on a number of intuitions from different perspectives and at different times. After all, we do with time obtain an "image of a thing." As we have seen in the chapter on *vision science*, this is an extremely complex interpretive process that is guided by certain laws and rules, a *grammar of seeing* as it were, and results in what is a highly probable image of reality but is never a simple direct copying process that lets us capture reality *directly*, one-to-one, as the EAN illusion that still seems to resonate in Strawson will have it. However, and we had better point this out again: Kant ultimately also starts out from *intuitions*, that is, from finished initial images of *singular*,

*immediately* intuited *objects* which, however, as previously described, need to be linked, sorted, organized in time to make the content understandable. In this context, Kant fails to account for the fact that due to the "*inverse problem*" previously described, that is, the quasi-infinite possibilities of actual image formation, the *field of vision* already needs to be organized in accord with the laws of gestalt for an initial image to be formed at all, and that even the initial *image* in our imagination is not an "*immediate and individual representation*" simply "*given*" to us but already the *result* rather than the *starting point* of certain processes. Nevertheless, Kant's concept of *productive imagination* and the entire idea of *synthesis* already constitute the decisive and significant progress beyond the *mechanism of self-deception* so persistently at work in realism and empiricism!

But even a well-organized field of vision does not warrant an unambiguous organization and interpretation of the perceived *manifold*. Take, for example, the case of *camouflage* (also discussed in Wolfgang Metzger's "*Laws of Seeing*"): the hunter's trained mind sees the deer in the forest and, if we go by the stimulations on the retina (which, according to Quine, is all we need to obtain a visual image of the world), so does the lay person who, however, does not "see" the well camouflaged deer at all although, in purely physical terms, he is affected by the same impressions of the "given" on his retina. But the objects in the field of vision must first be synthesized and configured by the *imagination* before the mind can in a third step (see above – CPR, B 106) and by means of the *concepts* even begin to generate reasoned insights and make judgments on the basis of the objects configured and isolated, with the highest possible degree of correctness, by the *imagination*; which, as Kant points out, is completely different from another faculty which is also, if "*falsely*," called *imagination*, namely the faculty to produce "*images*" from memory,

"*… which is however of a wholly different sort, for it is one thing when I imagine a palace that I have seen earlier and something else when I make new images.*" (loc. cit., p. 54)

Thus, the cognitive process presents itself as a sequence of steps, as Kurt Walter Zeidler notes, a "*progression*" which Kant, in the B version of the *Critique of Pure Reason*, clearly conceives of as *top-down*:

"*Here is their progression: The genus is representation in general (repraesentatio). Under it stands the representation with consciousness (perceptio). A perception that refers to the subject as a modification of its state is a sensation (sensatio); an objective representation is a cognition (cognitio). The latter is either an intuition or a concept (intuitus vel conceptus). The former is immediately related to the object and is singular; …*" (CPR, B 376/377)

In this version, *intuition* is "*immediately related to the object and is singular*" (as already critically discussed), which reveals it as the lower end of

the progression towards cognition, in the course of which, however, it needs processing in the synthesis by the imagination. To simplify matters, I will pass by the entire debate about how "*immediately*" relates to "*singular*" and adhere to Kant's formulation in this respect: in its relation to the object, *intuition* is "*immediate*" and "*singular*" – "*immediate*," however, under the reserve that the sensations have been organized in the forms of space and time and that the field of vision has been conditioned by the laws of gestalt and other imaging procedures, as set forth in the *Transcendental Aesthetic*.[1075]

With this, we have given a first impression and rough outline of Kant's conception of the cognitive process and the terminology relating to it as well as, at the same time, explained why the initial field of vision alone is still insufficient as a basis for us to generate far-reaching insights such as "*there is a strange dog in the garden*." However, in this *Lecture*, as I'd like to explicitly confirm in this context, Kant indeed associates the *formative synthesizing faculty* with the *lower* (!) cognitive faculty, that is, *sensibility* in the broadest sense. But while its capacity goes far beyond passive seeing, it is not yet a function of the understanding. In the B edition of the *Critique of Pure Reason*, Kant will have changed his mind, associating the *imagination* with the *higher* (!) *cognitive faculty*. So, what we have here is a "hot spot" that will become relevant for *visual thinking*. Furthermore, it should be noted that what is meant by the synthesizing action of the imagination thus described is the synthesis that accounts for the configuration of images from the manifold, in contrast to *a priori synthesis* which is Kant's term for the transcendental faculty of thinking in general since it combines subject and predicate to make necessary and universally valid judgments; another term for it being *intellectual synthesis* (CPR, B 152). The respective functions of these syntheses differ widely, even though in the B edition, Kant associates both of them with the *higher cognitive faculty*, that is, the *understanding*, albeit without specifying their different functions or their limits.

So, without wishing to anticipate, let's note that the crucial methodological concept here seems to be that while functionally, the *imagination* is indeed the active image-forming or representation-generating faculty, it is, at the same time, not *passive* and, thus, does not conform to Kant's characterization of the sensibility as *receptive*. As a result, the *imagination* is in an ambiguous position: on the one hand, it is a "spontaneous" and unifying faculty that accomplishes the fundamental process of synthesis without which no cognition, at least of objects, would be possible at all. On

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[1075] Cf., among others: Jaako Hintikka, On Kant's Notion of Intuition, in: The First Critique, T. Penelhum, J.J. Macintosh (eds.), Wadsworth Publishing, 1969; Yaron Senderowicz, The Coherence of Kant's Transcendental Idealism, Springer Doordrecht 2005.

the other, it is *not a conceptual faculty* but a faculty that conditions the manifold of the field of vision so as to enable the assignation, in the imagination, of concepts to objects or, inversely, of objects to concepts, with all their relations and connections. Obviously, Kant later reevaluated the *active* element of the *imagination*, i.e. the accomplishment of synthesis, conceiving of it as more than mere "image processing" and, therefore, repositioning it with the higher cognitive faculty. Both has its rationale, depending on the *perspective*, as previously discussed, that guides the build-up of the *Critique of Pure Reason* and, thus, determines the status of the *imagination* that is supposed to accomplish the blending of intuition and understanding. From the *empiricist* perspective, that is, "*bottom-up*" and starting out from "*the raw material of sensible impressions*" (CPR, B 1), the imagination is an image-processing function that configurates objects from the manifold; from the vantage point of *rationalism*, that is, top-down from the "*headstone*" of *transcendental apperception*, the focus is on the *function* of the imagination to enable "*the object* [to be] *given in some way*," to blend rule-based concept and configured object, for "[*w*]*ithout that the concepts are empty*" (CPR, B 195).

### Further observations by Kant concerning the *imagination*

Discussing Strawson's misinterpretations has already helped us to come to a deeper understanding of the problems of imagination and synthesis, and further help may now come from an examination of a number of other explanations by Kant concerning the *imagination*. Overall, we have seen that in his earlier writings, Kant conceives of the imagination in rather broad terms whereas in the *Critique of Pure Reason*, and due to its position between transcendental aesthetic and the categories, its functions seem much more clearly focused. Rudolf Makkreel notes:

"*An examination of Kant's precritical writings will show, however, that Kant first considered a much broader range of functions for the imagination – only some of which were developed in the Critique of Pure Reason, while others can be related to the activities of the imagination in the Critique of Judgement.*"[1076]

In his *Reflections on Anthropology*, Kant distinguishes between 1. "*sense*," i.e. the receptive faculty, 2. the "*imagination*," and 3. the "*comparative faculty*," and comments on this as follows:

[1076] Rudolf A. Makkreel, Imagination and Interpretation in Kant, University of Chicago Press Chicago/London 1990, p. 9.

"*The senses provide the material for all our representations. From this material, the formative faculty, unreliant on the presence of the objects, makes representations, in the first place. Formative power, imaginatio.*"[1077]

Again, we have the trichotomy of sensibility, imagination, and understanding. By means of our senses, we take in sensory impressions as we are affected by things. For Kant, this is a passive process although, as we have seen in the chapter on *vision science*, even this initial intake of sensations by the senses is already a selection in accordance with the laws of gestalt and the laws of probability. The *formative faculty* is also referred to here, which is an important point since it indicates that Kant already thinks beyond the bounded empiricist doctrine and its ready-made images of the inner film. An object needs, first, to be *formed*, i.e. *figuratively synthesized*, from the vague field of vision before thinking can begin to conceptually define it by means of the "*comparative faculty*," that is, the understanding. Kant then specifies the "*formative faculty*":

"*The imagination is conceived of as either the cause of the representations or the cause of the connection of representations. In the former case, it is the* facultas figendi. *What is the reach of the faculty to invent? The imagination either links the representations as intuitions with each other, or the latter to concepts* (facultas characteristica)." (loc. cit., p. 91, # 118)

Here, the imagination is conceived of as the *cause* (!) of the representations, from which it clearly follows that the representations must first be *formed* from the "*the raw material of sensible impressions*" before they can emerge, as figurative representations, from their spatial-temporal organization. Thus, even in these notes, the imagination is already endowed with the blending, formative, *productive* role without which there could be no mental representations or images at all. This is why Kant calls it a *facultas figendi* in these notes, that is, a faculty that can invent or arrange things. This is significant indeed, for in his book "*Kant's Analytic*," Jonathan Bennett, another often-quoted EAN Kant critic, makes short shrift of Kant's reference, in the chapter on schematism in the *Critique of Pure Reason*, to the "*representation of a universal procedure of imagination in providing an image for a concept*":

"*The nasty phrase 'representation of a universal procedure' just means 'rule.'*"[1078]

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[1077] Immanuel Kant, Reflexionen Kants zur kritischen Philosophie: Aus Kants handschriftlichen Aufzeichnungen, Benno Erdmann (ed.), Leipzig 1882, p. 90. § 26, # 117. (There seems to be no English translation of Kant's handwritten *Reflexionen zur Anthropologie* (*Reflections on Anthropology*) which contain drafts for his lectures, so the English versions of the respective quotations in this chapter are a provisional suggestion; translator's note.)

[1078] Jonathan Bennett, Kant's Analytic, Cambridge University Press 1966, p. 141.

This is another typical example of the "excellence" of the EAN readings of Kant. For when Kant speaks of "*a hidden art in the depths of the human soul*," or a *facultas fingendi*, he knows exactly why he chooses to do so. And in the chapter on *vision science*, we have already seen that due to the *inverse problem*, i.e. the theoretically infinite possibilities of interpreting sensory perceptions, there is no analogous, simple, linear way in terms of a simple *rule* (!) from this "*raw material of sensible impressions*" to the figurative representations of objects. Rather, there is a complicated interpretive process which Kant, going even further in terms of *schematism*, conceives of as a "*hidden art*," or *facultas fingendi*. The *general* image or *general representation* of a thing or an animal first needs to be formed before it can be adequately identified by the concept. In contrast to what EAN persists in believing, there simply is no *direct* way from the impressions of the field of vision to the concepts, nor inversely from the concepts to the adequate *general* (!) mental images. By his arrogant reference to Kant's "*nasty phrase*," Bennett actually shows that he is not even aware of the real problem of schematism. *Imagination* in Kant is indeed an "*ambiguous concept*"[1079] that may cover both *figurative* and *conceptual* representations, or be composed of elements of both of them, and is close to what Descartes describes as the "*idea*" that" *must be formed as distinctly as possible in the imagination*." Moreover, this "*ambiguity*" is a systemic requirement because the *imagination*, as we have seen, is not only called upon to synthesize diverse intuitions but also to transform them, by means of *schematism*, into concepts as well as enable the inverse process from concept to intuition. We already begin to get an idea of the multidimensional function of the *imagination* in the "production chain" from the field of vision, i.e. intuitions, to concept and, inversely, from concept to intuition.

Kant then offers some further reflections on what the *power of imagination* can accomplish:

"*The faculty to make an image, or a sensible representation, in the absence of the object. Reproductive vs. inventive faculty. 1. imagination is active (we play with it; law of association.) 2. fantasy is passive (it plays with us; law as yet unknown, e.g. of completion).*" (loc. cit., # 120)

These reflections again help us to deepen our understanding. While up to this point, Kant rarely refers to images, preferring, in most cases, to speak of representations or concepts, he does so here. The imagination can form an image of an object even in the *absence* of this object, which is what Kant calls its reproductive or inventive faculty. So, the *imagination* not only has the function of *actively* configuring objects in the field of vision

[1079] Kurt Walter Zeidler, Grundriß der transzendentalen Logik, Cuxhaven & Dartford 1997, p. 45.

and forming them in the perception, it can also figuratively present objects that are *not present* ("*a palace that I have seen earlier …*"). Kant conceives of it as an *active* faculty, which means that we can actively think of an object and figuratively imagine it whereas fantasy just happens to us, as dreams do, it is beyond our control and is therefore defined as *passive*. Later in these notes, he further says that the imagination "*represents vividly and with great precision*" and asks himself whether "*the images are retained in the brain or in the soul*" (loc. cit., # 123; p. 92, # 128). And still later, he even offers a description that clearly associates the imagination, the "*formative faculty*," with the "*lower cognition*" of the "*senses*":

"*The formative faculty pertains to the form of the entire lower cognition, namely coordination, since we connect representations in different ways. From this, the sensible concept, or a concept of the senses, originates.*" (loc. cit., p. 95, # 143)

This observation is important because Kant emphasizes the *formative faculty*, that is, the faculty of structuring the chaotic representations of a manifold and, thus, comes close to the functions we have dealt with in our discussion of the laws of gestalt. Kant, however, attributes them to the *lower cognitive faculty* (!), that is, sensibility in the broadest sense, and in this context speaks of the "*concept of the senses*," whatever this is supposed to mean since the concepts are, after all, the "currency" of the higher cognitive faculty. This will later clash with the overall positioning of the imagination in the B edition. To speak of *concepts* at this raw stage of cognition suggests, in my view, that more *structure* and more of the *universal* is present already at this level than Kant cares to admit. He then offers a further specification:

"*The imagination differs from the formative power in that it makes an image without the presence of the object (albeit out of material from the senses), either fingendo or abstrahendo*." (loc. cit., # 145)

This is again in accord with the *Lectures*. The *formative faculty* is clearly positioned as the faculty of forming objects from the field of vision whereas the imagination denotes the faculty of representing objects that are not present. Both faculties, or capacities, will later be attributed to the imagination by Kant, a threefold group in the A edition, only biphasic in the B edition. But be that as it may, there is one thing that clearly results from Kant's tentative reflections on the faculties of the *imagination* in this context: the objects of the field of vision, of the *manifold*, are not represented – as in Hume, for instance – as copies that simply need to have their names affixed to them, they are identified in and extracted from the field of vision, interpreted, synthesized, and formed by an "*art*," an *inventive* and, therefore, *active faculty*. This is diametrically opposed to the *passive* inflow of simple ideas into Locke's *dark cabinet*, or the *faded* images

of the inner film that result from Hume's *copying mechanism*, and is certainly not a rule as suggested by Bennett. With this, we have gained a first impression of how Kant, apart from the *Critique of Pure Reason*, may have conceived of the function and the capacities of the *imagination*. But before engaging in the critical discussion of the position of the imagination in the A edition as compared to the B edition of the *Critique of Pure Reason*, there still is a crucial point – already referred to in the Introduction – that needs clarifying, a point that has rightly kept busy generations of philosophers, namely Kant's peculiar observation

"*… that there are two stems of human cognition, which may perhaps arise from a common but to us unknown root, namely sensibility and understanding, through the first of which objects are given to us, but through the second of which they are thought.*"[1080]

Thus, for Kant, the "disjunction" – already repeatedly referred to – of sensibility and understanding, or intuition and concept, and the subsequent need to transform them into each other for cognition to be possible at all, leads to the question of a "*to us unknown root*" from which both sensibility and understanding are supposed to stem; which, of course, means that the primary focus is again on the imagination since Kant posits the latter as the "third term" whose role it is to connect, or enable communication between, the two "*stems of human cognition*," *sensibility* and *understanding*. So, let's now go into this intriguing question, this mystery bequeathed to us by Kant.

## Solving the mystery of Kant's cryptic reference to "*a common but to us unknown root*" of sensibility and reason

As a first approach, there is Hans Vaihinger's meticulous compilation of the commentaries of eminent philosophers on Kant's mystifying hint, so let's briefly follow his own commentary and the quotations he has so painstakingly selected and commented upon. To begin with, and in addition to the above-quoted original passage in the *Critique of Pure Reason*, B 29, Vaihinger presents another quotation, this one from Kant's *Architectonic of pure reason*. There, Kant says that he wants

"*… to begin only at the point where the general root of our cognitive power divides and branches out into two stems, one of which is reason.*" (CPR, A 835 / B 863)

Thus, the image, or metaphor, used by Kant is clearly and distinctly defined. He hypothesizes a (common) "*general root of our cognitive power*"

[1080] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 135 (B 29).

which "*divides*" (!) and "*branches out into two stems* (of cognition), *one of which is reason*" (the other one being sensibility). Vaihinger then begins his discussion of the diverse attempts to solve this Kantian puzzle by referring to an observation by the Hegelian Eduard Erdmann to the effect that Kant himself had never sought to inquire into this common root and had, on the contrary, referred "*with something like annoyance*" to Carl Leonhard Reinhold's attempt to "*go further upstream and look for a common foundation of sensibility and understanding*."[1081] One feels that in terms of drama and daring, this comes close to the upstream journey in Joseph Conrad's "*Heart of Darkness*"! Besides Reinhold, Erdmann further mentions Beck and Maimon as well as Fichte, all of whom attempted "*to find this 'root.'*" Kuno Fischer highlighted the impact this "*significant word*" had on identity philosophy, Michelet argued that Kant had suggested the means "*of finding this root: the intuitive understanding*," while Alfred Hölder thought that Kant "*himself had ascertained, without explicitly saying so, the imagination as this common root*" (loc. cit., p. 486). Then there is Jakob Friedrich Fries who believed to have found the common root in "*receptive spontaneity*," Hermann Cohen's suggestion that the image of the two stems of cognition was more consistent with the metaphor of the common root than that of the two *sources*, and, finally, Johannes Rehmke who, in his 1880 work "*Die Welt als Wahrnehmung und Begriff*," believed to have found the common root in perception. Ernst Cassirer, in turn, used Kant's famous dictum of "*a common but to us unknown root*" as an opportunity to reflect on the "*different strata of existence*," namely that sensibility and understanding "*may have a common root in a primal stratum of being which precedes all empirical separations but which we cannot grasp or determine more closely*."[1082] The interesting term here is the "*primal stratum of being*," for it basically suggests a natural primal basis to which intuition and understanding may trace back.

The most significant and meticulous search for Kant's "common root" is arguably the one undertaken by Martin Heidegger. In his legendary work "*Kant and the Problem of Metaphysics*," Heidegger engages in an attack, as resolute as it is revealing, which, aiming right at the heart of the *Critique of Pure Reason*, is meant to eradicate the leading role of the spontaneous and creative mind, i.e. understanding and reason, and existentially-ontologically re-anchor the roots of cognition in the bleak blood and soil of the Sein. This requires a number of purposeful surgical experiments on the understanding, a detailed account of which would push the boundaries of the present study. One of these experiments concerns Kant's concept

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[1081] Hans Vaihinger, Commentar zu Kants Kritik der reinen Vernunft, Stuttgart 1892, Vol. 1, p. 485.

[1082] Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 8.

of time in relation to the transcendental subject, another one, more topical here, focuses on the version of the imagination in the B edition which, as discussed above, was reconceived, by Kant, from a more rationalistic perspective and no longer adhered to the A edition's rather psychology-of-faculties view of the imagination. And this is the very point for Heidegger to start the surgical intervention which is supposed to result in a re-anchoring of the somewhat more "down-to-earth" A-edition version of the *imagination* in the "Sein." With his characteristic intelligence and perspicacity, he realizes that there may have been an oversight in Kant's ordering of the elements of cognition in the different versions and descriptions – *three* functions vs. *two* stems – and concludes that where Kant speaks of *two* stems, there is room for a *third* faculty, namely the *imagination*. And so, arguing that the very presence of a third term between two known ones justifies the assumption of a common root, Heidegger poses the rhetorical question, the answer to which he has meticulously planned in advance:

"*Is it possible that this originally unifying [bildende] center is that 'unknown, common root' of both stems? Is it accidental that with the first introduction of the imagination Kant says that 'we are scarcely ever conscious' of its existence?*"[1083]

Heidegger skillfully stages his supposedly great discovery, and his expedition to the "Holy Grail" seems to have been a success. Unsurprisingly, therefore, the next chapter of his book is entitled *The Transcendental Imagination as the Root of Both Stems*. In it, he logically demonstrates how the imagination, firmly rooted in healthy German soil, can ensure the unity of sensibility and understanding:
"*The disclosure of the origin which has been characterized above shows, rather, that the structure of these faculties is rooted in the structure of the transcendental imagination in such a way that the latter can 'imagine' something only through its structural unity with the other two. ... The formation of this original unity is only possible, however, if the unifying element lets the elements to be unified spring forth*." (loc. cit., p. 145, 147f.)

Thus, Heidegger's expedition has resulted in an unambiguous ascertainment of the role of the *imagination*, namely as the *root* and, thus, guarantor of an "*original unity*" which "*lets the elements to be unified spring forth*" from "*the unifying element*." His quest for the "Holy Grail" is accomplished, and the treasure thus secured is proudly presented as something to go down in history. Unfortunately, however, his glorious expedition is on a dead-end trail, a "Holzweg," as it were.

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[1083] Martin Heidegger, Kant and the Problem of Metaphysics, trans. by Richard Taft, Bloomington: Indiana University Press 1990, p. 144.

## "*Verwandtschaftsverhältnisse*" – affinity and genealogical relationships

Let's start our inquiry with Kant's "*Anthropology from a pragmatic point of view*" (1798). Although in this work, Kant does not proceed with the logical stringency that characterizes his *Transcendental Deduction* but seeks to offer a synopsis of the human faculties from an anthropological point of view, his observations are relevant insofar as this is a late work and, therefore, offers an insight into his reasoning of later years. He argues:

"*The power of imagination (facultas imaginandi), as a faculty of intuition without the presence of the object, is either productive, that is, a faculty of the original presentation of the object (exhibitio originaria), which thus precedes experience; or reproductive, a faculty of the derivative presentation of the object (exhibitio derivativa), which brings back to the mind an empirical intuition that it had previously…. The power of imagination, in so far as it also produces images involuntarily, is called fantasy.*"[1084]

The first thing to note is the description of the imagination "*as a faculty of intuition without the presence of the object*." For if we take Kant at his word here, the *object* is *seen* in the intuition, which again suggests that, on the one hand, *intuition* in Kant is the raw basis from which the imagination first needs to synthesize the objects while, on the other, the imagination already seems to feature concretely *seen* individual objects. Once again, Kant's ambiguous use of *intuition*, previously discussed, makes itself felt. In some contexts, it is supposed to be the lowest level of perception, the "*extreme end*," where the "*raw material of sensible impressions*" is passively taken in while in others, it already holds *finished*, *individual objects* we can look at! The description furthermore suggests a binary subdivision of the imagination into a *productive* and a *reproductive* one. This is roughly consistent with the *productive imagination* that is introduced in § 24 of the B edition's *Transcendental Deduction*, namely the "*figurative synthesis*" which, basically, has the function of forming, that is, "producing," objects and figurative representations from the *manifold* of sensory perception. What is implied here is Kant's major insight that contrary to Hume's doctrine, objects are not "directly" copied in the perception but first need to be synthesized, or produced, from the "*rhapsody of perceptions*" of the *manifold*. And this synthesis, or configuration, of objects from the *manifold* is guided by laws that are *a priori* since the *unifying* function cannot be found in either the manifold itself or the arbitrary and spontaneous activities of the mind, which would never result in meaningful objects; it can only be found in rule-based connective patterns such as those ascertained by, for instance, *gestalt* theory. True to its name, *reproductive imagination* is supposed to bring back to the mind empirical intuitions we once

[1084] Immanuel Kant, Anthropology from a pragmatic point of view, in: Immanuel Kant, Anthropology, History, and Education, Cambridge University Press 2007, p. 278.

had – "*a palace that I have seen earlier …*" –, thus enabling us to draw comparisons, for instance with the palace we actually see. Without this faculty, we would obviously not be able to make any such comparisons.

In his *Anthropology*, however, Kant offers a very interesting if rarely quoted reflection which not only contributes to our understanding of the *function of the imagination* but, moreover, opens up an alternative approach to the mystery of the "*common root*." In it, Kant refers to a "*kinship*" – "*Verwandtschaft*" in the original, which also translates as "*genealogical relationship*" – between *sensibility* and *understanding*, that is, intuition and concept, which differs from the metaphor of the root in that, logically speaking, a *root* necessarily precedes the two *stems* that grow out of or "*sprout forth from*" it whereas *kinship* – "*Verwandtschaftsverhältnisse*," or "*genealogical relationships*" – per se can also be otherwise structured; which could well be the decisive clue that leads to the solution of the problem:

"*The word affinity (affinitas) here recalls a process found in chemistry: intellectual combination is analogous to an interaction of two specifically different physical substances intimately acting upon each other and striving for unity, where this union brings about a third entity that has properties which can only be produced by the union of two heterogeneous elements. Despite their dissimilarity, understanding and sensibility by themselves form a close union for bringing about our cognition, as if one had its origin in the other, or both originated from a common origin; but this cannot be, or at least we cannot conceive how dissimilar things could sprout forth from one and the same root.*" (loc. cit., B 84 / B 85, p. 287)

This observation now offers the key to the solution. For Kant first likens the coming-together of *sensibility* and *understanding*, or *intuition* and *concept*, to a reaction between chemical substances that "*brings about a third entity that has properties which can only be produced by the union of two heterogeneous elements.*" But this again presupposes that the two domains of *intuition* and *concept* are, in some hidden way, mutually compatible, i.e. *transformable* into one another, or consist of the same "*basic material*," for if one tried to mix oil and water, for instance, the result would not be a chemical reaction at all, let alone a "*third entity*" with new properties. Which means that Kant again faces the basic problem of *synthesis*, namely how *intuition* and *concept*, being the two "*extreme ends*" of the cognitive process, can be entirely different and yet somehow compatible and capable of being transformed into one another in such a way that synthesis can happen at all and bring forth a *third entity*, namely new knowledge. This, however, as Kant quite rightly notes, presupposes "*Verwandtschaft*," "*kinship*" – or, to clarify my point, "*genealogical relationships*" – and "*Verwandtschaft*," understood as a biological metaphor, ultimately signifies that the elements involved stem from the same "genetic" material, for only then can intuition and concept be transformable into

one another – can be related, as it were! Seen from this angle, the question now quite clearly is: how can entities that are so disparate, "*elements*" that are so "*heterogeneous*," namely intuitions, i.e. processed *visual* sequences of images, on the one hand, and conceptualized thoughts, on the other, form a "*union*" that results in a "*third entity*", namely *synthesis* and, thus, cognition – and how are we to conceive of the common transformational and unifying element that must be present so that, on the basis of their *genetic* relationship. the *heterogeneity* of the two spheres can be overcome?

And this is where the *Visual turn* and our previous study of *vision science* and the anthropological preconditions for the emergence of vision and language come to fruition! For we have taken Richard Gregory's suggestion seriously that there must have been a workable "*grammar of seeing*" that preceded the emergence of language by hundreds of thousands of years. This *grammar of seeing* that is ascertainable in the *laws of gestalt* and the other "rules of seeing" and laws of *vision* previously described then became the basis for the development, some 50.000 years ago, of *conceptual* thinking and the structures of the *universal grammar* of language. With this, we have found the explanation why and, primarily, *how* these intuitions can be synthesized with concepts, why there must be a hidden "*genealogical relationship*" between these two, and why synthesis is possible at all. Which, in my view, spells out the solution to the Kantian problem. In this respect, all those who have tried to find it, and first of all Heidegger, have arguably been led astray by Kant's metaphor of the "*unknown root common to us*" whereas the metaphor of the *relationship* – "*Verwandtschaft*" – is definitely helpful. For while, logically speaking, sensibility and understanding are not "equipotent" entities, and cognition by concepts is no doubt superior to cognition by vision, both of them, intuition as well as concept, are still the *children of cognition*. From an evolutionary biology perspective, however, these children – *intuition* and *concept* – were not "born" at the same time. Rather, the emergence of *vision* and *visual thinking* of course *preceded* that of any spoken language! This alone would suffice as a reason why the metaphor of the common root is an inadequate means of accounting for the facts, whereas "kinship" or "*Verwandtschaft*" suggests a historical-genetical development of the cognitive faculties. The metaphor of the common root was obviously not helpful in this context. A "genealogical relationship," however, can be structured in terms of generations, with the *grammar of vision* coming first, the *understanding of function*, or *visual thinking*, second, and *universal grammar* third – a sequence that follows the sequence of evolution itself since language cannot have existed *before* vision. Being structurally *related*, all three generations are fully *compatible* since all three genetically stem from the same structure. And this is precisely why, as previously argued, virtually all metaphors for thought processes are taken from the visual domain.

Now we *see the light*, and the overall context is suddenly quite *clear*! So, when discussing the basic structure of the concept, i.e. Cassirer's "symbolic pregnance," this relationship will have to be taken into account.

But the "genealogical relationship" between grammar of vision and grammar of language does not mean that there are no open questions. How is this "union" of the "*heterogeneous elements*" brought about, what is the function that effects the transformation, and: where, in Kant, do we find this "transitional state," i.e. the thought that grasps something even before the concept comes into play? The first question is easy to answer, for there can be no doubt that Kant attributed the role of bringing together intuition and concept and of effecting synthesis in general, where this "ambiguous position" is quite evident, to the *imagination*. However, when it comes to assigning the imagination to the domains of either sensibility or understanding, Kant is remarkably undecided: in the A edition, he conceives of it as an image-processing faculty and a function of *sensibility*, while in the B edition, he describes it as a *function of the understanding* which is spontaneous and *acts on* the sensibility. So, let's take a closer look at this ambivalence, this indecision in Kant, for it may well mark the very point, the very "gap," in the Kantian theory of cognition where *visual thinking* could be located, reorganizing the entire transition from *sensibility* to *concept* into a harmonious *progression of steps* rather than an erratic and ambiguous effort to position the imagination while, at the same time, retaining, in good rationalistic tradition, the transcendental structure and the upward progress towards the idea.

## Kant's A-edition version of the imagination explained as a consequence of the "empiricist perspective"

As previously noted, the A-edition version of *Transcendental Deduction* gives the impression that Kant, starting out from the "*raw material of sensible impressions*," sought to step by step demonstrate how the *sensations* that are *passively* received by the senses can be transformed into logically stringent concepts and judgments by means of the *categories*. In this step-by-step transformational process, the *imagination* is assigned a central role in terms of *synthesis*. In the "guideline" chapter of the *Critique*, Kant specifies:

"*Synthesis in general is, as we shall subsequently see, the mere effect of the imagination, of a blind though indispensable function of the soul, without which we would have no cognition at all, but of which we are seldom even conscious. Yet to bring this synthesis to concepts is a function that pertains to the understanding, and by means of which it first provides cognition in the proper sense.*" (CPR, A 78)

Here, the role of *synthesis*, without which knowledge would be impossible, is clearly attributed to the *imagination*. The actual *recognition* of objects as well as their modalities and relations can therefore (in this first version) only happen if "*this synthesis*" – assuming that Kant meant the product of this synthesis – is brought "*to concepts*." This clearly defines that the activity of the *imagination* is independent of or, in terms of the sequence of events, prior to, the subsequent process of *conceptual cognition*, and that what has *previously* been figuratively synthesized must now be *brought to concepts*! Karl Hepfer highlights the change made by Kant in the B edition at this point, which he regards as a major difference between the A and the B edition:

"*Here, instead of 'a blind though indispensable function of the soul,' he speaks of a 'function that pertains to the understanding.' … While in the A edition, Kant explicitly describes the imagination … as an independent cognitive faculty between understanding and sensibility, the B edition conceives of it as a function of the understanding alone, thus effectively classing it with the upper cognitive faculty*."[1085]

Kant then (CPR, A 79) goes on to describe the function of the imagination in the cognitive process as that of the *synthesis* of the given *manifold*, that is, the synoptic structuring and combining of the still unorganized "*material*" of the sensibility in view of its subsequent processing by *conceptual* thinking. This connective activity must, therefore, already be capable of accomplishing the synthesis of the chaotic material of the *manifold* in a way that is *meaningful* rather than haphazard, that is, already oriented to what is *universal* and *necessary* and, thus, at all compatible with the concepts that now come into play. So, let's see how, in the A-edition *Deduction*, Kant further presents and functionally analyzes the role of the *imagination* as the agent charged with accomplishing the synthesis of the manifold. Kant first invokes the "*synthesis of apprehension in the intuition*" whose function it is to "*run through and then take together this manifoldness*" in order to achieve the *unity* of perception and cognition. The very heading already implies that this can only be an "image-generating" or "image-building" faculty capable of grasping, in the very act of going through it, what has been *directly* taken in by the *intuition*. In the case of the town in the distance or the room "*piled high with pictures and decorations*," for example, the *synthesis of apprehension* would, first, "*take together*" the manifold impressions in such a way that we do not perceive a kaleidoscopic chaos. This would be followed by the *synthesis of reproduction in the imagination* and, with it, the extremely complicated issue of the order in which the phenomena of the world can be "given" to us, which is embedded in it but which, due to its complexity, I'd rather

[1085] Karl Hepfer, Die Form der Erkenntnis – Immanuel Kants theoretische Einbildungskraft, München 2006, p. 74.

not go into any further here. This faculty is also concerned with the configuration of the "image build-up," as already implied by the heading of the chapter. Kant states that the representations themselves succeed each other "*in accordance with a constant rule*," thus ensuring the constancy of our representations which, in turn, is the condition for us to be able to process series of thoughts in the imagination rather than keep grappling with "*unruly heaps*" of them. On the basis of this consideration, Kant concludes that the *synthesis of apprehension* must be "*inseparably combined with the synthesis of production*" (CPR, A 102), and counts both of them "*among the transcendental actions of the mind*." Hansgeorg Hoppe describes the function of the *reproductive imagination* as follows:

"*Here, Kant assumes that what is first given to us is always only a manifold of perceptions, i.e. that the perceptions are, first, 'encountered dispersed and separate in the mind;' therefore, they must be combined and brought 'into an image.' This bringing-together is supposed to be accomplished by the imagination, i.e. the faculty of 'calling back a perception, from which the mind has passed on to another, to the succeeding ones, and thus [of] exhibiting entire series of perceptions' (A 121).*"[1086]

To illustrate the *synthesis of reproduction*, Kant then offers some interesting examples which indeed provide food for thought (A 102): if we "*draw a line in thought, or think of the time from one noon to the next, or even want to represent a certain number*" to ourselves, we "*must necessarily first grasp one of these manifold representations after another in* [our] *thoughts*" (the number line comes to mind). But representations such as the line we draw in thought are not dependent on *conceptual* thinking! Rather, we *think* the geometric object *visually* before the *concept* "line" comes into play at all! However, the above examples are already organized in a way that is meaningful and, invariably, *category-guided*. So, let's take note that for Kant, the *imagination* acts as a transcendental faculty, a central function of the cognitive process, and is subdivided into *three transcendental actions*, and that *two* of these actions, or functions, are definitely dedicated to "*image generation*" – they already create meaningful and organized sequences, structures, and relations of representations and do not need a *concept* to do so, which suggests that this must be a *visual* kind of thinking which is not yet conceptual but already under the rule of the categories and, as such, capable of producing meaningful and logically organized representations!

And now comes the exciting part, for now, as a *third* function of the *one* power of imagination which in all his writings and lectures has up to this point been described as just a representing faculty dedicated to "*image building*" and, also, *fantasy*, Kant introduces the "*synthesis of recognition in the concept,*" with "*in the concept*" being the pivotal element. Here, the focus is not on the sequence or order of the representations nor on

[1086] Hansgeorg Hoppe, Synthesis bei Kant, De Gruyter Berlin/New York 1983, p. 100.

the retaining of thoughts but on the anticipation of unity in thinking. Matthias Wunsch characterizes this function, in the Kantian sense, by saying

"*… that we need to have a 'consciousness that that which we think is the very same as what we thought a moment before' since, otherwise, 'all reproduction in the series of representation would be in vain' (A 103) … This means that this synthesis is supposed to be an identifying synthesis; it identifies 'that which we think' with that 'what we thought a moment before*.'"[1087]

Wunsch contrasts this faculty with the *synthesis of reproduction* which he aptly describes as "*presence-ensuring reproduction.*" The *synthesis of recognition in the concept* has, thus, a somewhat ambiguous position, for it describes those aspects of the imagination that are concerned with generating images, on the one hand, and with conceptualizing them, on the other. So, what we have here is clearly a function which is partly still *visual* and partly already *thinking*. We are not far from *visual thinking* anymore!

This peculiar *sub*-division of the *imagination* into *two* "image generating" and *one* partly still visual and partly already *conceptual* procedure has, to my knowledge, rarely been subjected to any in-depth scrutiny, most commentators being more concerned with the functionality of certain activities of the imagination taken separately. But Sarah Gibbons highlights the crucial point of this "border crossing" between visual processes and concept:

"*Notice that Kant acknowledges that this guidance provided by concepts is limiting, in so far as 'determining' the manifold requires that it meet the 'conditions which make unity of apperception possible'. This point supports the view that not all synthesis need meet those conditions, and therefore that synthesis and conceptualization are not identical, although conceptualizing is itself an act of synthesis.*"[1088]

In plain terms, this means that the *concept* which now gets involved in the *synthesis of recognition in the concept* in order to bring about the *unity* of the determination by the understanding is also somewhat limiting with regard to the "material" of intuitions and representations that was synthesized by the first two, i.e. vision-oriented, faculties of the *imagination*. Therefore, Gibbons concludes quite rightly that the processes of visual synthesis and the act of conceptualization are *not identical* even though conceptual determination is the decisive act of synthesis (if the result is to be a language-based judgment). Kant will account for this consideration in § 24 of the B edition by resorting to a two-part differentiation between

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[1087] Matthias Wunsch, Einbildungskraft und Erfahrung bei Kant, De Gruyter Berlin/ New York 2007, p. 156.

[1088] Sarah Gibbons, Kant's Theory of Imagination, Clarendon Press Oxford 2002, p. 27.

*figurative* synthesis and *intellectual* synthesis only (incidentally also the more elegant solution), thus fully implementing the separation between image-generating visual synthesis and conceptual-intellectual synthesis but, in doing so, indeed aggravating the problem of how the two "*stems of sensibility and understanding*" are supposed to come together since *figurative* and *intellectual* synthesis remain *disconnected*.

Kant, then, makes a number of somewhat disconcerting statements which are actually much more problematic than the B-edition account. For this reason alone, I cannot join in the enthusiasm for the A edition shown by so many commentators:

"*Hence we say that we cognize the object if we have effected synthetic unity in the manifold of intuition. But this is impossible if the intuition could not have been produced through a function of synthesis in accordance with a rule that makes the reproduction of the manifold necessary a priori and a concept in which this manifold is united possible*." (CPR, A 105)

Now, this is somewhat irritating insofar as, firstly, the *intuition* which is otherwise described by Kant as giving the object *directly* and *separately* to us, is here described as "*produced through a function of synthesis in accordance with a rule*," which means that it cannot be *direct* (apart from spatio-temporally organization) because this is something the *imagination* is supposed to do thereafter. This may have been a mere oversight. But then, quite suddenly – and this is the crucial point –, the *concept* turns up (as already indicated by the heading), and it does so in the very context of *recognition* although we are actually still in the process of "image generation," or the generation of representations. One is at pains to understand why it is necessary for the concept to step in at precisely this point, i.e. in the context of the *synthesis of recognition in the concept*, since we know that representations can very well be retained without the intervention of a concept, cases in point being simple manual activities. For the issue under discussion, however, the relevant point here is Kant's statement that the intervention of the concept is needed for discursive cognition to be possible at all. Finally, Kant proceeds to the famous *Deduction* "*from beneath*" to explain the role of the categories in the syntheses previously described, which also confirms that the categories must from the start be an active part of the process of "image generation":

"*Now we will set the necessary connection of the understanding with the appearances by means of the categories before our eyes be beginning from beneath, namely with what is empirical.*" (CPR, A 120)

And Kant to continue in terms of the *empiricist perspective* "from beneath":

"*The first thing that is given to us is appearance, which, if it is combined with consciousness, is called perception.*" Thus, Kant here follows the mental "food chain" of the empiricists. "*But since every appearance contains a manifold, thus different perceptions by themselves are encountered dispersed and separate in the mind, a combination of them, which they cannot have in sense itself, is therefore necessary. There is thus an active faculty of the synthesis of this manifold in us, which we call imagination, and whose action exercised immediately upon perception I call apprehension.*"

Here, Kant again specifies the idea that the role of the *imagination* in the *synthesis of apperception* is that of combining the mind's dispersed and separate perceptions in a well-organized way.

"*For the imagination is to bring the manifold of intuition into an image; it must therefore antecedently take up the impressions into its activity, i.e., apprehend them.*" (CPR, A 120)

So, while he does occasionally say that the object is "*immediately given*" to us in the *intuition*, Kant here speaks of the *intuition* of the *manifold* of impressions, i.e., virtually, the unstructured, primitive state of perception which first needs to be brought "*into an image*" by the *imagination*; which is also the correct description of intuition! At this point, the function of the *imagination* is conceived as a purely "image-generating" one, namely by means of the syntheses of apprehension and reproduction. But then, Kant comes to the crucial step of the *Deduction* "*from beneath*" by bringing into play the "*synthetic unity of apperception*," that is, the apprehending unity in the "*standing and lasting I*" as the logical endpoint and, at the same time, "headstone" of this process which all the representations that have so far been formed must relate to because, otherwise, they could not be an element of a unitary and integrated consciousness. In what follows, the fundamental concept of the synthetic unity of apperception, namely "*that I am conscious a priori of their necessary synthesis, which is called the original synthetic unity of apperception, under which all representations given to me stand, but under which they must also be brought by means of a synthesis*" (CPR, B 135), becomes Kant's trump card, drawn to counter every conceivable objection, and always winning.

This, however, means that while the *imagination* already organizes the separate representations in view of the unitary, self-conscious I, on the one hand, all these synthesizing actions are still accomplished at a *pre-conceptual* level of cognition, on the other! The hidden "*operations*" of the imagination are, thus, already category-guided and relate to the I *BEFORE* the level of the concept has even been reached on the way up "*from beneath*." Rudolf Makkreel, too, highlights that in the A edition, Kant already suggests the presence of actions that are still pre-conceptual but nevertheless understanding-like:

"*There are also passages in the 'Nachträge zur Kritik der reinen Vernunft (1. Auflage)' which show that, at least for a time, Kant held that a preconceptual transcendental synthesis of the imagination was possible. For example in one entry Kant writes: 'The transcendental synthesis of the imagination underlies all our concepts of the understanding.'*"[1089]

And Sarah Gibbons notes that Kant's disjunction of *intuition* and *concept*, focusing as it does on the *concept* as the exclusive product of the categories, tends to ignore all other forms of cognitive structuring:

"*…he emphasizes the problem of the Objective Deduction, namely, the justification of the categories as objectively valid pure concepts. This focus leads Kant largely to neglect to consider the possibility and necessity of an extra-conceptual order in intuition and its relevance to explaining the subjective conditions of judgement.*"[1090]

This continual, or gradual, way up from intuition to concept chosen by Kant in his A-edition demonstration of the categories is effected by the imagination which, by means of the twelve categories previously set forth, imposes a transcendental-logical order on the phenomena, which order is, by this very fact, already *category-guided*:

"*We therefore have a pure imagination, as a fundamental faculty of the human soul, that grounds all cognition a priori. By its means we bring into combination the manifold of intuition on the one side and the condition of the necessary unity of apperception on the other. Both extremes, namely sensibility and understanding, must necessarily be connected by means of this transcendental function of the imagination, …*" (CPR, A 124). And, finally, Kant brings together the threads of his argumentation: "*These grounds of the recognition of the manifold, so far as they concern merely the form of an experience in general, are now those categories. On them is grounded, therefore, all formal unity in the synthesis of the imagination, and by means of the latter also all of its empirical use (in recognition, reproduction, association, and apprehension) down to the appearances, …*" (CPR, A 125)

With this, we have reached an important point in our discussion, so some commentaries are required. So far, Kant has attributed the functional actions, previously described, of "*recognition, reproduction, association, and apprehension down to the appearances*" to the *power of imagination* only as a means of generating an "image" in the imagination. Also, he has always described the *imagination* as a function pertaining to the *lower cognitive faculty*, that is, *sensibility*. But if we take Kant at his word here (and are ready to ignore certain inconsistencies concerning the status of the *intuition*), he now clearly conceives of the *imagination* as an "image-generating" procedure that is already capable of organizing the *manifold*

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[1089] Rudolf A. Makkreel, Imagination and Interpretation in Kant, University of Chicago Press Chicago/London 1990, p. 27.

[1090] Sarah Gibbons, Kant's Theory of Imagination, Clarendon Press Oxford 2002, p. 51.

into objects that are *meaningful* (!) with regard to the unified I and organized, in their representations, in such a way that the adequate concepts, that is, the concepts that are most likely to be consistent with the objects thus formed, can "step in" at a higher level (always seen "from beneath"). Although it is, of course, quite clear that these are mere phases, or elements, of a unitary and unity-oriented process, the problem thus outlined is further clarified by another passage where Kant describes the central role of the imagination:

"*It is therefore certainly strange, yet from what has been said thus far obvious, that it is only by means of this transcendental function of the imagination that even the affinity of appearances, and with it the association and through the latter finally reproduction in accordance with laws, and consequently experience itself, become possible; for without them no concepts of objects at all would converge into an experience.*" (CPR, A 123)

The point here is Kant's observation that "*without them no concepts of objects at all would converge into an experience*." For according to Kant's own definition, what can converge in or by the *imagination* is never concepts because concepts pertain to the understanding. The "products" of the imagination can, in their gestalts, be grasped and denominated by conceptual thinking, but what "*converges*" at the level of the imagination is plainly not concepts but schemata, or gestalts!

Inversely, however, this means, as previously argued, that (from the top-down perspective chosen in the revised B edition) the *imagination* is already capable of forming, in its representations, a meaningfully synthesized or structured world even though no concept has as yet been involved! This is the consequence that Kant brought upon himself by adhering to the empiricist way of proceeding "from beneath," but from the vantage point of the *Visual turn*, it is a quite essential conclusion since it shows that already at the level of visual representations, a transcendental-logically world is being configured, in accord with the categories and with regard to the I, even *before* the *concept* steps in or gets involved in these representations. Of course, from Kant's viewpoint, no cognition is possible unless the concept actually comes into play since he conceives of thinking exclusively in terms of *conceptual* thinking. But actually, there no longer is a gap to bridge at this point since by the synthetic functions previously described, the logical order of the categories has already been imposed on the figurative products of the imagination, with no mention of, let alone need for, a concept; which anyway does not come into play, from a functional point of view, until much later, i.e. in the *synthesis of recognition in the concept*.

## Kant's B-edition reconfiguration of the role of imagination and synthesis

In the second and final version of the *Critique of Pure Reason* Kant, as previously mentioned, seems to have returned to his rationalistic roots and turned away from his deference to empiricism. Also, the change in perspective may have been a within-system requirement, for as soon as Kant proceeds to the *Principles of Pure Understanding* in order to explicate the general conditions of the application of the categories, he needs to "*proceed from concepts to the intuition but not from the intuition to concepts*" (CPR, B 199). In his *Kommentar zur Kritik der reinen Vernunft* Hermann Cohen, at any rate, notes this increasingly critical perspective on *empiricism* in the context of the *Transcendental Deduction*:

"*The second edition, then, contains a rejection of the 'famous Locke' and 'David Hume' by taxing the former with having 'opened the gates wide to enthusiasm' and the latter with giving 'way entirely to skepticism.' 'The empirical derivation, however, to which both of them resorted, cannot be reconciled with the reality of the scientific cognition a priori that we possess, that namely of pure mathematics and general natural science, and is therefore refuted by the fact.'*"[1091]

Wolfgang Marx, in turn, repeatedly refers to Cohen's critical approach to Kant's architecture of the *Critique* and quotes the following observation by Cohen:

"*Accordingly, the supreme principle of apperception had to be placed at the top of the reconstruction, thus giving greater stringency to the deduction of the motives of the system since the unity of the consciousness could again be posited as the unity of the principles, thus precluding any divergence in terms of the psychological element of the individual consciousness*."[1092]

Of course, this rethinking as well as the logical constraints inherent to the system could not fail to impact on the way the functions of the *imagination* were conceived. In our discussion of the *A-edition* version of the *imagination*, we have already noted a subdivision of the power of imagination into the first two of its functions, i.e. the *synthesis of apprehension* and the *synthesis of reproduction* as the "image-generating" functions, on the one hand, and the *synthesis of recognition in the concept* as a faculty, on the other, that in part still pertains to the imagination, in part already to *conceptual* thinking. This *third faculty* of the imagination comprises activities that are image-generating and yet *already conceptual* and, thus, of a "Janus-

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1091 Hermann Cohen, Kommentar zu Immanuel Kant's Kritik der reinen Vernunft, Leipzig 1907, p. 53.

1092 Wolfgang Marx, Transzendentale Logik als Wissenschaftstheorie, Frankfurt/M. 1977, p. 71; Hermann Cohen, Kants Theorie der Erfahrung, Berlin 1885, p. XII.

faced" nature, a fact which, however, is never reflected on or explained by Kant!

Let's now turn to Kant's description of the *power of imagination* and its synthesizing function in the revised B-edition version of the transcendental deduction, primarily focusing on § *24*. Here, Kant, as indicated by the heading, is concerned with "*the application of the categories to objects of the senses in general*." The perspective is now clearly "top-down" from the integrating unity of the self-conscious I, and the logical starting point is the patterns of thought of the *categories* and the subsequent question of how to *apply* them "*to objects of the senses*." Again, the manifold has to be combined and ordered in a rule-based way with regard to the synthetic unity of transcendental apperception, but now the guiding aspect is that of an "*application of the categories*" rather than an empiricism-inspired step-by-step "bottom-up" process from "*sense experience*." Kant presents a concise novel description and division of *synthesis* which now comprises only *two* rather than three functions, with the previously posited distinction between "image-generating" and conceptual synthesis clearly confirmed:

"*This synthesis of the manifold of sensible intuition, which is possible and necessary a priori, can be called figurative (synthesis speciosa), as distinct from that which would be thought in the mere category in regard to the manifold of an intuition in general, and which is called combination of the understanding (synthesis intellectualis); both are transcendental, not merely because they themselves proceed a priori but also because they ground the possibility of other cognition a priori*." (CPR, B 151)

With this, Kant is obviously back to reasoning along the lines of a more rationalistic approach, confining himself to a relatively concise account of the functions of synthesis. Rather than *three* faculties presented in great detail and from a rather psychological, representation-oriented perspective, there now are only *two* types of a priori *synthesis*. In this context, the *imagination* is defined as follows by Kant:

"*Imagination is the faculty for representing an object even without its presence in intuition*." (CPR, B 151)

Thus, the *imagination* is back to its roots, and defined as an "image-generating" procedure. The formulation "*representing an object even without its presence in intuition*," however, is somewhat confusing for it almost gives the impression that notwithstanding the fact that *intuition* is supposed to be direct and separate, it can already "give" the object, albeit in the imagination. Rudolf Makkreel comments on this change:

"*Kant gives no explicit reason why he chose to rename this synthesis a 'figurative synthesis', but the term 'figurative' aptly suggests the graphic, more spatial qualities that the imagination contributes to synthesis. Insofar as the imagination synthesizes it*

*serves the understanding, but in that role it also brings to bear some of its own formative power.*" [1093]

This very aptly captures the new, more figurative-spatial character of the imagination as well as the new way of organizing it, i.e. the distinction between its genuinely *formative activity*, on the one hand, and the conceptual-nonfigurative activity that already pertains to the understanding, on the other. These fundamental changes in the B-edition version of the *Deduction* and the role of the imagination did not escape Heidegger's attention, either:

"*Kant begins by striking out in the second edition the two principal passages in the preceding edition which specifically present the imagination as a third fundamental faculty beside sensibility and the understanding. The first passage (A 94) is replaced by a critical discussion of the analyses by Locke and Hume of the understanding, just as if Kant — although mistakenly — looked upon his conception in the first edition as being still too close to the empirical. ... In place of 'function of the soul,' he substituted 'function of the understanding.'*"[1094]

Heidegger's observation provides further evidence that in the B edition, Kant, after due deliberation, found it more reasonable to distance himself from empiricism, which resulted in his rethinking the *imagination* in terms of an active function of the understanding. Heidegger construes this as a '*recoil from the imagination*' which he conceives of as the true common root of sensibility and understanding. From a perspective of existential ontology, this development is, of course, undesirable because the conception of the first edition was maybe misinterpreted as proximity to the "Sein" and the *imagination* was construed as a faculty of the individual in his or her state of being "thrown" into the "Dasein," and supposed to be independent of understanding and a priori *reason*. Kant's repositioning of the imagination as a *function of reason* deprived it of this primal, non-rational status and made it an agent of reason, the very faculty which, for Heidegger, was so highly "objectionable" and, what is more, saddled with the entire burden of having defined the damnable wrong track followed by mankind since Plato and, especially, Descartes.

In point of fact, Heidegger's observation is correct – Kant shifts the position of the imagination halfway into the domain of the understanding and also states his reasons for doing so. But in my view, the "recoil" here is from the proximity to empiricism rather than from the imagination:

"*Now since all of our intuition is sensible, the imagination, on account of the subjective condition under which alone it can give a corresponding intuition to the concepts*

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[1093] Rudolf A. Makkreel, Imagination and Interpretation in Kant, University of Chicago Press Chicago/London 1990, p. 30.

[1094] Martin Heidegger, Kant and the Problem of Metaphysics, trans. by Richard Taft, Bloomington: Indiana University Press 1990, p. 166f.

*of understanding, belongs to sensibility: but insofar as its synthesis is still an exercise of spontaneity, which is determining and not, like sense, merely determinable, and can thus* determine the form of sense a priori *in accordance with the unity of apperception, the imagination is to this extent a faculty for determining the sensibility a priori, and its synthesis of intuitions, in accordance with the categories, must be the transcendental synthesis of the imagination, which is an effect of the understanding on sensibility and its first application (and at the same time the ground of all others) to objects of the intuition that is possible for us.*" (CPR, B 151 / B 152; my emphasis)

This is a profound and highly illuminating passage, for now, since ultimately and "*on account of the subjective condition*" of our perception "*all of our intuition is sensible*," Kant classes the *imagination* with sensibility and (as a consequence of the "top-down" perspective) ascribes the function of combining the categories with a "*corresponding intuition*" to the latter. This means that what is *given* to us now (as laws implanted in the mind) and what we start out from is the categories, just as previously the "*given*" was the form of our sensible intuition, and that it is the *imagination* that is now supposed to figuratively form the intuition so as to enable the understanding, which Kant conceives of as purely conceptual, to process it in a meaningful way. At the same time, "*insofar as its synthesis is still an exercise of spontaneity, which is determining and not, like sense, merely determinable, and can thus* determine the form of sense a priori *in accordance with the unity of apperception,*" the imagination cannot be a purely *sensible* function since sensibility is conceived of as *passive* (!) by Kant. Therefore, the imagination is now seen as determining, *active*, spontaneous, and as working a priori "*in accordance with the categories*" and in the mode of the unity of the self-conscious I. This status of the imagination is quite clearly specified in § 24: "*… the imagination is to this extent a faculty for determining the sensibility a priori, and its synthesis of intuitions, in accordance with the categories, must be the transcendental synthesis of the imagination.*"

What is being stated here implies that the function of the *imagination* is defined as a synthetic *a priori* activity which, "*in accordance with the categories*," combines and organizes the manifold of sensibility. But this further means – and for the *visual turn*, this is the crucial point – that the synthetic generation of images from the manifold by the imagination already happens *under the rule of the categories* even before the *intellectual-conceptual* synthesis steps in; which is the very hallmark of the workings of the understanding, and the reason why the *imagination* is now explicitly characterized as an active and determining function of the understanding. Kant makes this very clear by unequivocally designating the *imagination* as the "*figurative synthesis*" that is capable of forming something meaningful. Which further means that the active, "image-generating" function of the imagination which we rely on when imagining, say, a straight line, already acts in accordance with the categories even *BEFORE* the concept,

or conceptual thinking, comes into play, for in § 24, *intellectual synthesis* and *figurative* synthesis are definitely posited as distinct functions by Kant:

"*As figurative, it is distinct from the intellectual synthesis without any imagination merely through the understanding.*" (CPR, B 152)

This is also why Kant here, in line with his reflections in other writings, describes the imagination as a *productive imagination* (CPR, B 152). This means that the A-edition distinction between the first two functions, namely the *synthesis of apprehension* and the *synthesis of reproduction*, on the one hand, and the *synthesis of recognition in the concept*, on the other, is retained but, now, in the form of a clear and distinct separation: here *figurative synthesis*, there *intellectual synthesis* "*without any imagination merely through the understanding.*" Interestingly, Kant refrains from further characterizing this *intellectual synthesis* in any detail, and his commentators also rarely venture to specify what exactly we are to understand by it if a simple subsumption under the understanding, i.e. conceptual thinking, is per se precluded. It is once again Sarah Gibbons who closely follows the text in her reflections and comments upon this breaking point in both editions:

"*This distinction between figurative and intellectual synthesis may bear some resemblance to the distinction between the productive/reproductive synthesis of imagination, on the one hand, and the synthesis of recognition in a concept, on the other, which Kant employs in the A-edition.*"[1095]

However, as Gibbons points out, Kant has very little to say about *figurative synthesis*, either, and statements about *intellectual synthesis* and about imagination are extremely scarce in § 24 when compared to the weight and great detail of the respective chapter in the A edition.

So, if we go by Kant's last word in this matter in § 24 of the B edition, this is what we find: we dispose of the *imagination* which figuratively forms and synthesizes the as yet unstructured *manifold* of the intuition in view of the synthetic unity of apperception and in the forms of the *categories* in such a way that the second function of the understanding, i.e. purely intellectual synthesis, can conceptually capture the configuration thus prepared. Insofar as the *imagination* is concerned with "figurative image generation" and the configuration of the field of vision, it is part of the sensibility, but insofar as it is itself already actively and spontaneously – as well as "*in accordance with the categories*" – involved in this configuration, Kant thinks of it as part of the understanding. In terms of its overall functionality, this *figurative synthesis* of the imagination resembles – at least in this final description by Kant – what we have come to know as *visual*

[1095] Sarah Gibbons, Kant's Theory of Imagination, Clarendon Press Oxford 2002, p. 38, fn. 28.

*thinking*. For its role is to generate, or figuratively form, objects, spatial structures, or geometric figures, on the one hand, while by acting in line with the categories and with regard to the self-conscious I, it is *at the same time* not a fantasy nor a producer of arbitrary images but acts, as Kant quite clearly states, "*a priori*" and "*in accordance with the categories*." As a consequence, it must already and *at the same time* be a *form of thinking* rather than a free and creative but nevertheless merely "formative" function – it *is* already *visual thinking* even *BEFORE* intellectual synthesis captures what has been formed by concepts! This again marks the very point where seeing and thinking have grown together and cannot be separated any more.

## The transformation of mental images and concepts in the schematism

In the literature on Kant, the chapter on schematism is usually deemed both pivotal and "obscure." However, in "*Kant and the Problem of Metaphysics*," Martin Heidegger argued: "*Far from being 'confused,' the chapter on schematism is perfectly clear in its construction*." Also, for him,

"*… these eleven pages of the Critique of Pure Reason form the heart of the whole work*."[1096]

For now that Kant has explained how, by means of the *imagination* in accordance with the categories, a structured gestalt, e.g. an object of the field of vision, can be *figuratively* formed from and distinguished in the chaos of the *manifold*, while on the opposite side of the hiatus between *sensibility* and *understanding*, the categories discovered by him are already impatiently waiting to be applied to phenomena, he now faces the sobering question of *how* these infinitely diverse phenomena with their infinitely diverse colors, forms, relations, and constellations can be "*brought under a concept*;" which, inversely, entails the even more intricate problem of how adequate mental images can be "*given*" to concepts. In my discussion of this question, I will confine myself to the perspective defined by our previous discussion of *vision science* and the *power of imagination* and refrain from dealing with the general temporal schematization of the individual categories, which Kant elaborates in detail. This is because, firstly, it is not fully comprehensible to me; secondly, I can't see why the concrete application of the categories should be based on a mere temporal schematization rather than a spatial model for a spatially perceived world; and, thirdly, this temporal schematization is not that crucial for the ascertainment

[1096] Martin Heidegger, Kant and the Problem of Metaphysics, trans. by Richard Taft, Bloomington: Indiana University Press 1990, p. 117f. and p. 94.

of *visual thinking*. So, since Kant quite rightly, from the rationalistic perspective, starts out from *judgment* and the categories of the *understanding*, the peculiar problem arises of how these categories that have been distilled out by logical means can be applicable at all to the "products" the *imagination* has formed from the manifold. In his "*Geschichte der neuern Philosophie*," Kuno Fischer explains this very descriptively:

"*To apply the categories to the phenomena, we must represent the latter by the former, or subsume the latter under the former: this constitutes the possibility of transcendental judgment. Now, the phenomena are sensible, the categories, in contrast, are intellectual, the former spring from intuition, the latter from the understanding: they could not be more dissimilar. This is the difficulty, which concerns not the validity but the applicability of the categories. If the subsumption of the phenomena under pure concepts is not possible, the proven validity of the latter does not help, they are, then, as valid but also as useless as the gold of Midas*."[1097]

But how, concretely, is this supposed to happen since concepts are concepts and intuitions are, in principle, spatio-temporally organized fields of vision, how can they ever be transformed into one another? Also, notwithstanding his acknowledgement of Kant's idea of synthesis, there is Hegel's cautionary criticism:

"*The connection of these two is again one of the most attractive sides of the Kantian philosophy, whereby pure sensuousness and pure understanding, which were formerly expressed as absolute opposites, are now united.* There is thus here present a perceptive understanding or an understanding perception (my emphasis)*; but Kant does not see this, he does not bring these thoughts together: he does not grasp the fact that he has here brought both sides of knowledge into one, and has thereby expressed their implicitude. Knowledge itself is in fact the unity and truth of both moments; but with Kant the thinking understanding and sensuousness are both something particular, and they are only united in an external, superficial way, just as a piece of wood and a leg might be bound together by a cord.*"[1098]

Although this criticism is somewhat unfair, for Kant does conceive of an "*interaction*" between intuition and understanding, it becomes clear what an inadequate concept of synthesis would be like. Kant himself approached this problem by the methods of formal logic, with the principle of *subsumption* serving as his thought model:

"*In all subsumptions of an object under a concept the representations of the former must be homogeneous with the latter, i.e., the concept must contain that which is represented in the object that is to be subsumed under it, for that is just what is meant by the*

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1097 Kuno Fischer, Geschichte der neuern Philosophie, Dritte Auflage, Band III, München 1882, p. 377.

1098 Georg Wilhelm Friedrich Hegel, Lectures on the History of Philosophy, trans. E.S. Haldane 1892–1896, accessed at: https://www.marxists.org/reference/archive/hegel/works/hp/hpconten.htm

*expression 'an object is contained under a concept.' Thus the empirical concept of a plate has homogeneity with the pure geometrical concept of a circle, for the roundness that is thought in the former can be intuited in the latter.*" (CPR, B 176)

Now, this is a very interesting statement if we consider what must actually happen in this case. First, in order to be able at all to understand what "round" means, I must have understood *roundness*, the meaning of the concept in itself, the perfect circle in its essence or its definition. However, as previously discussed in some detail, I can never have concretely seen the perfect circle, I must at some point have understood its essence by *insight* into the nature of the idea of perfect "roundness." So, when perceiving a round plate (there are also octagonal plates, for instance), I now apply the concept "roundness," once grasped by means of a circle, to the concrete and not perfectly round plate, and it appears to me that I have *subsumed* the plate under the concept "roundness," or the concept "circle." But actually, and prior to this, I must have *figuratively* formed, by a *synthetic a priori* action of the understanding, the plate from a *manifold* of representations. So, to be able at all to form the concept of the perfect circle, I first needed to perceive non-perfect round objects and circles, or their images and representations formed in my mind's eye, while the concept, in turn, contained the *rule* or, rather, if we go by Ernst Cassirer's *concept of function*, the necessary determinations, relations, and functional connections of the perfect circle. Only then can it appear to me that the concept must already have been there and that all I needed to do was to "subsume" the plate under it by applying the rule of the concept. On the other hand, the *imagination* had, by figurative synthesis in accordance with the laws of gestalt, already formed my sensory perceptions of the object as a round gestalt. What I am getting at is that due to the transcendental constellation of the application of the categories, it may indeed appear to me that I projectively apply concepts to individual cases in order to "subsume" my mental images of objects under these concepts, while actually the image, or representation, is PRIOR to the concept in this process; which adds a further complication to any attempt at elucidating this transformation. For, formally speaking, Kant is right (because when we do think, we always already are in thinking), but on the other hand, we need to consider that we call round objects round because these objects are round and we have *already figuratively formed them as round*, rather than because we (allegedly) had the concept of round drilled into us and are now looking for round objects to "subsume" under it. Which means – and this is the point of my considerations here – that the procedure of subsumption has not brought us any closer to the solution of our problem, i.e. the *fundamental dissimilarity* of intuition and concept. Furthermore, what is lacking in this model is an understanding of the double function of the concept, exposed by Ernst Cassirer as an alternative to the well-

known positions in the misguided controversy over the problem of universals.[1099] In the excursus at the end of this book, I will trace the origin of the concept and try to work out a novel solution.

In fact, when it comes to concretely describing the function of *schematism*, Kant's otherwise extremely precise and analytical argumentation remains *vague*:

"*This schematism of our understanding … is a hidden art in the depths of the human soul, whose true operations we can divine from nature and lay unveiled before our eyes only with difficulty. We can say only this much: the image is a product of the empirical faculty of productive imagination, the schema of sensible concepts (such as figures in space) is a product and as it were a monogram of pure a priori imagination, through which and in accordance with which the images first become possible, but which must be connected with the concept, to which they are in themselves never fully congruent, always only by means of the schema that they designate.*" (CPR, B 180 / B 181)

Three things are worth noting here: firstly, the contrast could hardly be sharper between the clarity and stringency with which the forms and the function of thinking have so far been presented in the *Critique of Pure Reason* and the vagueness of Kant's present description of the *productive imagination* and, with it, *schematism* as "*hidden … in the depths of the human soul.*" Secondly, Kant again emphasizes that the workings and "*operations*" of the imagination are not conceptual in nature but at the same time refers to "*the schema of sensible concepts (such as figures in space)*;" which means that he again suggests conceptual qualities at a level where, according to his own doctrine, they should not be present at all! And, thirdly – and this is important for our further considerations -, he says that "*the images … must be connected with the concept … always only by means of the schema that they designate*," which makes it clear that even before they are "*connected with the concept*," the image and the schema must always already have been formed in a meaningful way, must always already have *concept-like structures*. The crucial point, however, is the observation at the end of the quotation, namely that the images are "*connected*" with the concept by means of the schema but are "*in themselves never fully congruent*" with it. As a logical consequence, this means that, on the one hand, we dispose of concepts as *rules* which – from the top-down perspective – we are to apply to the phenomena in order to "*subsume*" them while, on the other – from the bottom-up perspective –, we generate images and schemata produced by the imagination, which are "*never fully congruent*" with these concepts, i.e. these rules. Thus, the logical transformation remains vague on this point, which will turn out to be surprisingly useful,

[1099] Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 374.

while at the same time it becomes evident that a *universal, concept-like formation* must already exist at the level of productive imagination.

Furthermore, the essence of *schematism* and the "*hidden art*" of the imagination "*in the depths of the human soul*" can be misunderstood in yet another way, as pointed out by L. Chipman in his essay "*Kant's Categories and Their Schematism*":

"*We are still left with the problem, how is it possible to synthetise one's manifold in accordance with a pure sensible concept, such as a geometrical concept? All we have been told is that it is because we are in possession of a rule which enables us to do just that! The problem is not a new one, but simply Plato´s problem of giving an account of how it is possible to subsume a concrete particular under a thoroughly abstract universal. Kant´s solution involves locating the abstract universal and the mechanism of subsumtion in us, and viewing the mechanism of subsumtion as essentially 'constructive' in character.*"[1100]

In terms of "subsumption," the problem of *schematism* is indeed akin to Plato's question of how it is possible for an *abstract universal* to comprise, or contain, the always only *concrete particulars*, for instance when Plato has Socrates ask for the concept of virtue, and his dialog partners are at a loss what to do except enumerate one particular example of virtuous behavior after the other, or when someone ventures to subsume diverse particular dogs under the concept of dog. Also, numerous commentators have criticized Kant's mode of *subsumption* because they assumed a simple relation between universals and particulars. Henry E. Allison rightly criticized this assumption of a simple relation between the universal and the particular as plainly insufficient for an understanding of *schematism*: "*As Kemp-Smith puts it, this relation is properly one of form and matter, structure and content, not universal and particular.*"[1101]

But *schematism* is far more complicated than a mere relation of *form* and *content* because it is not only about the subsumption of individual objects under universal concepts, or the application of forms to matter. It is not only about subsuming a concrete dog, e.g. a German shepherd lying at my feet, under the concept of dog, it is about *how* the *schema* of dog-in-itself can be generated or *visually* represented at all in such a way that I can form a concretely represented schematic image of any dog up to the

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[1100] Lauchlan Chipman, Kant's Categories and Their Schematism, in: Ralph C.S. Walker (ed.), Kant on Pure Reason, Oxford University Press, Oxford New York 2004, p. 107f.

[1101] Henry E. Allison, Kant's Transcendental Idealism, – An Interpretation and Defense, Yale University Press, New Haven/London 2004, p. 211; in this context, his references are to: Norman Kemp-Smith, A Commentary to Kant's 'Critique of Pure Reason,' 2nd ed, New York: Humanities Press 1962; and the famous work by Ernst Robert Curtius, Das Schematismuskapitel in der Kritik der reinen Vernunft, Kant-Studien 19, 1916, p. 338–66.

boundary definition of a similar animal (a wolf, for instance) in my mind's eye so that it becomes possible at all to connect it with the universal concept! So, there always is this *abstract-conceptual* side of the problem but in addition, and PRIOR to it, there is a *visually-formatively representing* side that is no less universal but tends to be overlooked. Most commentators fail to do justice to these complexities which span *both* levels, they invariably start out from the concept only and, as a consequence, cannot but find the chapter on schematism "obscure." But if we get to the bottom of this idea of a *figurative representation* of a *universal, schematic* animal, we again find the objection raised by Berkeley and Hume that we can always only form a concrete, individual, *singular* representation of an object, be it animal or geometric figure, and that we can never imagine a *universal* triangle, for instance, but always only a concrete acute-angled, equilateral, etc. triangle which has, then, to stand, *as an individual* triangle, for other triangles. I have already previously referred to Bertrand Russell's response in this matter, namely that we can indeed imagine things in a "*vague*," that is, not one-hundred-per-cent accurate way, as well as to Max Brod and Felix Weltsch's concept that our *general mnemonic images* are always vague and "blurred" but are still sufficient for us to be able to identify an object in keeping with its nature. Brod and Weltsch were already on the right track, but their exposition as well as their focus on mnemonic images did not yet suffice as a cogent explanation of *universal representation*. We do not need a one-hundred-percent accurate representation of a normal crossroads to find our way, all we need is a quite elementary drawing of two lines crossing each other at the proper angle to know where to turn off. I have further argued that actually, we never have a perfect mental image of whatever object, in the first place, even though Hume subjectively claims to be able to accurately reproduce his room in his imagination. Basically, this argument was nothing but an argumentative subterfuge used by the sceptics to torpedo the very possibility of mental images of a *universal* nature.

With these considerations, we are now back to a more productive as well as more promising line of thought. What must the image of a dog or a crossroads look like to be *universally* applicable and, at the same time, not "betray" the concept, i.e. the set of rules embodied by it, or deviate from it to such an extent that it interferes with the boundaries of another concept? Before getting bogged down in this, let's once more turn to Kuno Fischer's reflections on how intuition and concept can find a common basis in schematism:

"*For such a judgment to be possible there would have to be a bridge, as it were, that leads from understanding to sensibility, from the region of pure concepts to that of sensible things, and vice versa: a mediating faculty between these two, which brings the sensible objects to the understanding. This mediating faculty, this connection be-*

*tween sensibility and understanding, has already been discovered in terms of the productive imagination. So, if the categories are to be applicable at all to the phenomena, this can only happen through the medium of the imagination. The latter would have to be able to do what the pure understanding can never do on its own: to figuratively represent, or sensualize, the categories and thereby make them similar in kind to the phenomena. The image in its proper sense is always the perfect expression of a sensible phenomenon, therefore there are images only of seen objects, never of concepts.*" (loc. cit., p. 378)

This very descriptive exposition of the problem implies yet another particularity of *schematism*. For Fischer correctly keeps to Kant's question of how the categories discovered and presented by him and which "*lie ready, until with the opportunity of experience they are finally developed and exhibited*" (CPR, B 91) can be applied to the intuitions, or phenomena, of our sensibility. Now, from the facts and processes, previously set forth, of the *evolution* of man we know that language was rather late to develop. Yet early humans must have been able to *visually distinguish and classify* certain animal species, e.g. stags, that is, "subsume" them visually long before they disposed of language at all – which, as we know today, did not happen until about 50.000 BP. Consequently, they must have been able to subsume a concrete, individual stag under their ideal-type representation of it since, otherwise, they would not have been able to identify and hunt it. This further implies that the capacity of forming a *general representation*, e.g. of a *schematic* stag such as it may have been preserved to the present day as a drawing on the wall of a cave, must have existed long *before* linguistic concepts were even available. But, then, the question cannot be how to "*apply*" categories to intuitions in order to subsume something under a concept (e.g. stag) but, inversely, how the "grammar of vision" could develop into a "grammar of language" in such a way that the *universal* which *must* already have been captured and concretized in *visual thinking* became the universal of the concept! And there is another very interesting aspect to this, namely an intellectual affinity to Ernst Cassirer's concept of "symbolic pregnance," which I will explore in detail in my Excursus: *The relation between visual thinking and Ernst Cassirer's concept of function* at the end of this book. But if we take Fischer's metaphor of the bridge that must logically lead both ways from one side to the other seriously, then the generalizing action of thinking, which is crystalized and linguistically anchored in the concept, is clearly, if subliminally, already to be found at the stage of *productive imagination*! Kuno Fischer continues:

"*The concept of the triangle is the triangle as such, which can be right-angled as well as oblique-angled; the constructed triangle we see is necessarily either the one or the other, as is the real image of the triangle. There is no image of the concept of triangle, let alone of the concept of man, animal, plant etc., for the real image is always a determinate individual, which the concept is not.*" – So far, this is consistent with what we

have discussed with respect to the perfect circle. – "*But our imagination is involuntarily prepared to figuratively represent the concepts of mathematics as well as those of experience, which it cannot express by images: it sketches their form in its outlines or contours, it gives us a monogram, as it were, of these concepts since it cannot give us their image; it can paint the sensible phenomenon but only sketch the general outlines of the concepts. It 'is a hidden art in the depths of the human soul, whose true operations we can divine from nature and lay unveiled before our eyes only with difficulty.' Such a monogram is called schema, in distinction from the image.*" (loc. cit., p. 378f.)

With this, Fischer makes it clear that just as there is no image of the concept of triangle (or of the concept of circle), there is no image of the dog or the stag in general, and that it is only the imagination which, then, "*sketches their form in its outlines or contours, it gives us a monogram, as it were, of these concepts since it cannot give us their images*"! Kant speaks of the schema as a "*procedure of the imagination*" that "*is in itself always only a product of the imagination; but since the synthesis of the latter has as its aim no individual intuition but rather only the unity in the determination of sensibility, the schema is to be distinguished from an image*" (CPR, B 179 / B 180).

Kant further highlights the Janus-faced nature of the schema as a "*mediating representation*" which "*must be pure (without anything empirical) and yet intellectual on the one hand and sensible on the other*" (CPR, B 177). I'd like to emphasize this already at this point because while, as a rule, all functions and concepts are assigned an *unambiguous* position and definition in Kant's system – the concept, for instance, is rigidly and strictly defined, one can't "go beyond" it -, the imagination, or schema, is the one and only exception in his doctrine in this respect, being defined as "*intellectual on the one hand, sensible on the other*," half fish, half fowl – an oxymoron. From the top-down perspective, i.e. starting out from the concept, Kant then gets even more specific:

"*Now this representation of a general procedure of the imagination for providing a concept with its image is what I call the schema for this concept.*" (CPR, B 180)

The thing for us to do now is to summarize and order all these many-faceted and complex strands of argumentation between intuition and concept, imagination and category, the particular and the general, representation and monogram of a representation. Basically, we are back to the pivotal question which we have already encountered in the context of Berkeley's and Hume's criticism concerning *general representations* in the process of abstraction. I will, therefore, once more return to the alternative description, offered by Kant somewhat later in the *Critique of Pure Reason*, of the mode of general representation that is one of the functions of the imagination:

"*It is entirely otherwise with the creatures of the imagination, of which no one can give an explanation or an intelligible concept; they are, as it were, monograms, individual traits, though not determined through any assignable rule, constituting more a wavering sketch, as it were, which mediates between various appearances, than a determinate image, such as what painters and physiognomists say they have in their heads, and is supposed to be an incommunicable silhouette of their products or even of their critical judgments.*" (CPR, B 598)

Basically, this key passage contains everything we need to solve the problem and at the same time identify the correct position of *visual thinking*. So, to be able to proceed quite clearly and distinctly, I will once again stringently list Kant's descriptions of schematism so "*that there can be no room for doubt*," as well as all the questions that follow from the claim that the imagination can produce *universal* representations of singular, individual objects and "*provide*" concepts with intuitions in the *gestalt* (my use of the term is intentional here) of monograms already at the *preconceptual* (!) level.

Let's first follow Kant's statements on *schematism*:

1. The schema "*is in itself always only a product of the imagination*."
2. The imagination, as synthesis, "*has as its aim … only the unity in the determination of sensibility*."
3. The schema is "*a general procedure of the imagination for providing a concept with its image*."
4. It is a "*mediating representation*."
5. Schematism / The schema is "*intellectual on the one hand, sensible on the other*."
6. Schematism "*is a hidden art in the depths of the human soul, whose true operations we can divine from nature and lay unveiled before our eyes only with difficulty.*"
7. The imagination creates, in this indescribable way, "monograms" of objects. "*Such a monogram is called schema, in distinction from the image.*"
8. These monograms only highlight "*individual traits … not determined through any assignable rule*" of a thing, they are thus diametrically opposed to the concept since they are not determined by a fixed *rule* that can be specified (as wrongly assumed by Bennett).
9. These monograms are "*more a wavering sketch, as it were, which mediates between various appearances, than a determinate image*." This is consistent with the *general representation* of a thing, which is the superior alternative to Berkeley's and Hume's assumption that there can always only be singular, individual representations.
10. The monogram is "*an incommunicable silhouette … such as what painters and physiognomists say they have in their heads.*"

With this, we have obtained sufficient information to understand how Kant conceives of the function of schematism and the *monograms* as products of the imagination. It is the very representation, highlighting *essential traits* in a partly vague, partly cartoon-like manner, which all human beings have in their mind's eye when they think of an object *in general* – a dog, an envelope, a face. This representation, retained in the mind's eye for just a few seconds, will never be able to reproduce an object with photographical precision, and yet we know that we are thinking of a dog, an envelope, a face. It is this very "*sketch*" which may well be "*wavering*" but is nevertheless capable of bringing out the *essential, general traits* so that a *general representation* of this object becomes adequately expressed. As Descartes had already understood some 150 years before Kant, the face of an individual can be represented by a few strokes of the pen and be quite recognizable although objectively, there is not the slightest photographic similarity between the drawing and the real face. It is this general representation alone, this "*wavering sketch … which mediates between various appearances*," to which the respective *concept* of dog, stag, house, or soldier can, then, be assigned, or, inversely, which can "*provide*" the concept with the respective image. For if – and this was the essential insight gained from Berkeley's and Hume's flawed reasoning – the representation was always only *singular* and *individual*, then it would indeed be impossible to assign a *general* concept to this singular representation. Besides, as we have already argued, it is actually impossible to *perfectly* copy and represent a concrete, individual object. This is why Berkeley and Hume took the triangle as an example because due to the supposed simplicity of the geometric figure, the skeptical subterfuge seems to work better in this case than in the case of an animal or a pile of laundry in a room. Of course, they never specified what the *concrete* triangle actually looked like in their representation, for a geometric figure, as Kuno Fischer has pointed out, is in itself a perfect concept which, however, can *never be perfectly represented* in its flawless form.

While Kant's way of expressing this action, or function, of the imagination is somewhat mystifying, Stephen Kosslyn's scientific studies and tests have already enabled us to recognize and understand many of the mechanisms at work in this generation of mental images. However, it is only now that we approach the decisive point of our study. For, here, the *imagination* accomplishes something that Kant's cryptical reference to the "*hidden art in the depths of the human soul*" tends to obscure if not blind out. Whatever the details of this process, the *imagination* clearly accomplishes something which, as a faculty, is commonly, and especially in Kant, attributed to the concept or conceptual thinking alone, namely condensing to and representing in its general and essential traits something we always only encounter in its singular and individual form ("*Essence must*

*appear*" – Hegel, *The Science of Logic*). In spite of being unequivocally defined as *not conceptual-linguistic*, *figurative imagination* is capable of generating a prototype, an *ideal-type representation*, a *monogram*, from the many different and always individual images of the most diverse views of dogs or stags or crossroads, which monogram can, then, symbolize *the dog* in a textbook, or *the crossroads* on a traffic sign. This condensed embodiment of the *universal* (!) in the representation, in a *figurative gestalt* (!) is thus found at a mental level where *conceptual thinking*, *language*, does not even exist, cannot yet operate at all. It is only at a later point that the concept steps in, while this synthesis of the imagination is an action that is "*intellectual on the one hand, sensible on the other*" and provides us with *preconceptual*, *ideal-type gestalts*. This is the crucial insight for our subject: the action of capturing the *universal*, which defines the *paradigmatic* nature, the *essence*, the "*primal stratum*" (Cassirer) of the concept, is realized in the faculty of *universal representation*.

If we now briefly call to mind the laws of *gestalt theory* as presented in the chapter on *vision science*, we see that within certain limits, this interpretive, configurative faculty is already at work at the image-building level of *vision* since it is there that, in fractions of seconds, a correctly configured, meaningful visual image must be formed from the chaotic field of vision, the "buzzing blooming confusion," organizing the hundreds of factors of vision previously discussed (lighting, contrast, color, shadows, forms, distortions, contours, object constancy, size constancy, height, depth, as well as all the laws of gestalt) into meaningful gestalts so that man's survival in nature becomes possible at all. We have also seen that the key to an understanding of these processes was the discovery and understanding of the *laws of gestalt*, and we have examined Richard Gregory's claim that these laws of vision, that is, the visual cognition that takes up half of our entire brain power, could be conceived of as an innate "*grammar of vision*." Now, another discovery comes into play, namely that visual thinking must already have existed many hundreds of thousands of years before conceptual-linguistic thinking, so that in actual fact, there never was any "*giving*" of "*images*" to concepts but, inversely, a gradual emergence of sounds and concepts that were assigned to the *ideal-typically and universally formed "images."* And so we understand that all the operations that Kant attributes to *productive imagination* and describes as "*intellectual on the one hand and sensible on the other*" are fully consistent with these facts, for *the universal* which is the signum of thinking is already formed and attained at a *visual* level in such a way that we can capture, represent, and recognize dogs and stags in their essential traits as ideal-type *gestalts* before language and concept can play a role at all.

Now, to pursue our argumentation, we need to once more bring into play the "perspective" that governs the reading of the *Critique of Pure*

*Reason*. For now that Kant has switched, in the B-edition version of schematism, to the top-down perspective and starts out from the *categories* discovered and presented by him, he faces the requirement of "*providing a concept with its image*." Ernst Cassirer gives a very descriptive account of this step as seen from the "top-down" perspective:

"*Here again, the imagination proves to be productive: we do not just read off the 'images' of the concepts but provide the concept, the mere abstract definition, with its image by constructing the concept in the intuition. The 'schema' is not the faded shadow of a real empirical object but the prototype and the model, as it were, for possible objects of experience*."[1102]

With his observation that the "*image*" of the concept is productively "*constructed*" by the imagination as "*the model, as it were, for possible objects of experience*," Cassirer introduces the extremely important concept of *model*. The argument here is that guided by the rule of the concept, we imagine a dynamic, ideal-type structure, a construction – a model. So, from the top-down perspective, and provided one already has a concept, the *imagination* produces a *model*, a *schema* of a thing, that answers to the essence of the concept.

But from the "bottom-up" perspective, Kant's own description of the schema tells us that this "*incommunicable silhouette*," this "*wavering sketch, as it were, which mediates between various appearances*," is the synthetic work of the image-generating functions which have as yet nothing to do with concepts as such. For when we see the *universal* as an *ideal-type schema* in our mind's eye, this *universal*, e.g. these *essential traits* that are *inherent* to all dogs, must already have been captured and understood, in precisely these *essential* structures, by the image-generating functions of the imagination; which, in turn, is only possible *because* the configurative laws of the *categories* are already at work in these "*operations of the imagination*", since otherwise we would probably never be able to identify the *essential*, *ideal-type traits* of empirical objects or animals, rather than some accidental, random properties. So, even before the *concept* "steps in," our visual thinking must have the faculty to capture the *universal*, i.e. the essence, of many empirical objects, that is, must be able to think, of *necessity*, the object as a "*wavering sketch, as it were, which mediates between various appearances*," and strip it of all that is accidental. For otherwise the universal could not be filtered out from the many individual particulars in such a way that it no longer contains anything accidental but only the ideal-type universal traits – the schema. This is why early man can draw the "image" of a stag on the wall of a cave without disposing of a language as we know it: it is not because he portrays a stag which is standing before

[1102] Ernst Cassirer, Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit, Band II, Darmstadt 1995 (1922), p. 715.

him but because in his mind's eye, there is this "*wavering sketch, as it were, which mediates between various appearances*," this monogram-like representation produced by his imagination. In some Japanese terms, the direct connection with or development into language of this "*wavering sketch, as it were, which mediates between various appearances,*" that is, the schema, is even directly visible, or recognizable. The Japanese term for river is kawa and looks like this: 川, the term for mountain is yama, schematically represented as 山. A mountain river is, then, 山 川, that is, a combination of the two schematic "monograms." The continuity between the activity of the *imagination* which already captures and expresses the universal in its *visual form*, and the *universal nature* of the concept is clearly visible here. The visually configurated universal form becomes the core, the intellectual-systemic heart of the concept. The *rule* that is embodied in and imposed by the *concept* is already present in the general form of the schema, therefore the rule is pre-conceptual in its origin, it must, as a consequence, stem from the grammar of vision, and its content is closer to the *visual model*.

The question that could be asked here is whether this procedure, i.e. the *visual* "*condensation*" of the *universal*, the visual filtering out or highlighting of the essential traits of an object, is an act of thinking or simply an automatic, intuitive cognitive function. So, let's briefly recall Kant's observation concerning the *logical use of the understanding* in the "guideline" chapter of the transcendental aesthetic:

"*But besides intuition there is no other kind of cognition than through concepts. Thus the cognition of every, at least human, understanding is a cognition through concepts, not intuitive but discursive.*" The concepts, in turn, are grounded on functions of the understanding, so Kant goes on to explain: "*By function, however, I understand the unity of the action of ordering different representations under a common one. Concepts are therefore grounded on the spontaneity of thinking, as sensible intuitions are grounded on the receptivity of impressions.*" (CPR, B 93)

Kant conceives of the thinking of the understanding as a *purely discursive, conceptual action* because for him, "sensibility" is uniquely "*grounded on the receptivity of impressions.*" Therefore, since he defines all the lower cognitive faculties as purely receptive and passive, it does not even occur to him that we might be able to form *universal representations* before concepts get involved at all! And yet it is evident, as previously demonstrated, that we are able to visually filter out, condense, understand the *general traits* of many individual objects already at the level of representations, which is obviously *not an automatic* process of visual cognition but a process of *thinking*. For it is obvious that schematic representations, monograms of a fact, apt caricatures are not spontaneously, automatically, and perfectly produced by everyone alike but differ in their level of reflection, which in turn is not primarily due to someone's drawing or "viewing"

skills but to the power of the faculty of abstraction, the only difference being that in this case, abstraction happens on a purely visual-representative rather than conceptual basis.

This further means that in some form, the hallmarks of reasonable thinking, namely *universality* and *necessity*, must already be present on a pre-conceptual level, for otherwise we would be quite unable to form ideal-type, monogram-like representations from always only singular, scattered images. Following this compelling logic, it becomes evident that there must be a continuous developmental line from the interpretive *gestalt laws* of *vision* to general representations in the form of the *not yet* rule-based "*wavering sketch, as it were, which mediates between various appearances*," where the workings of the categories are already evident and which must therefore, in Kantian terms, be "*intellectual on the one hand and sensible on the other*," that is, already have the character, if rudimentary, of *visual thinking*. The rule contained in the concept, the model, thus actually originates from the representation of the universal which has previously been figuratively and visually formed in the imagination in accordance with a rule of the *grammar of vision*. This ambiguity (which Kant never clarified) can be taken as an indication that in the context of schematism which "*is in itself always only a product of the imagination*," Kant, usually concerned to the point of obsession about the *clarity* of the concepts and functions of thinking, indeed allows for a function that is *both* sensible *and* intellectual. The evolution from the *innate* laws of gestalt to the *innate grammar of vision* to the *innate* categories of judgment and thinking to *innate universal grammar* and, then, *transcendental grammar* is indeed comprehensible and, if really thought through, cannot have been otherwise.

So, in Kant's doctrine, *visual thinking* is present in the domain of the *schematism* of the *productive imagination*, but unlike what Kant prefers to think, its function is not simply to provide the categories and concepts with adequate images. Rather, and inversely, this *visual thinking* is a much earlier development and also originates from the "*common but to us unknown root*" which has turned out to be the *grammar of vision*. From there, *visual thinking* must have developed to a point where it was possible for human beings to go beyond visual operations based on general schemata and ideal-type representations and think elementary logical steps, such as, for instance, rotating and modifying objects, using simple levers, stone tools, etc., which is what I have called the *understanding of function* and which already belongs to the realm of *visual thinking*. From this *visual thinking*, universal grammar and language must have gradually developed and, along with it, abstract conceptual thinking. Thus, we have been able to clarify the "obscurity," time and again criticized, of the chapter on schematism and to solve, at the same time, Kant's mystery of the "*com-*

*mon but to us unknown root*" as well as to establish that there is indeed concordance between the philosophical-logical approach of his philosophy and the anthropological-evolutionary development of man. So, my goal of ascertaining *visual thinking* at the appropriate places in the philosophies of Plato, Descartes, and Kant has been achieved – even though these thinkers did not consciously reflect on and describe it as such. The same is true for Wittgenstein's *ostensive showing*; and it has turned out that *visual thinking*, if properly accounted for and integrated in the respective philosophies, would lead to more within-system stringency, be it with respect to the grasping of the geometric idea in Plato, the grasping of the "*simple natures*" in Descartes, or the correct execution and presentation of the *schematism* of the *imagination* in Kant. So, what now remains to consider as the last step of this long and comprehensive movement of thought is the form the philosophy of *Neo-Kantianism* – as defended by Ernst Cassirer, open-minded and interested but at the same time unfaltering in his adherence to the Kantian spirit, in a continuous dialogue with the natural sciences – might assume when the insights thus gained are taken into account.

## VI. Philosophy after the *visual turn*: *rationalistic Neo-Kantianism* as the leading science-affine philosophy of the 21st century

Although I have been using the term of *Neo-Kantianism* from the very beginning of this study, it is the one term I have so far not tried to define or delimit. At the same time, I have frequently, and sometimes quite extensively, referred to exponents of *Neo-Kantianism*, and primarily those of the *Marburg School* – Hermann Cohen, Paul Natorp, Ernst Cassirer (Karl Vorländer was more historically minded) –, because in my view, they are the ones who continued the line of thought of *rationalism*, or *idealism*, from *Plato* to *Descartes* and, then, *Kant* without making the slightest concession, in whatever respect, to empiricism or materialism, and at the same time held on to the unifying element of geometry, mathematics, and the sciences. This "golden thread" (Geert Edel; Ursula Renz highlights Hermann Cohens "*Weltlinie*") of *idealism*[1103] is not only evident in the Marburg neo-Kantians' works on Plato and Descartes,[1104] it even left its traces in their other writings, at least up to the turn of the century. It should, however, be noted that Kant himself did not unambiguously see himself as part of this tradition and was reluctant to count Plato and Descartes among his predecessors even though the core of his doctrine is clearly rationalistic. The latter fact is evident from the basic theme of the synthetic a priori which made it clear that *sensory perception* alone, without structured a priori thinking, is "blind," as well as from Kant's reliance on mathematics and geometry, the deduction of the categories, the adherence to the self-conscious I as the "headstone" of his doctrine, and, more

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1103 Ursula Renz, Zwischen erkenntnistheoretischem Rationalismus und wissenschaftsphilosophischem Empirismus. Zu Cohens Philosophiebegriff; in: Christian Damböck, Philosophie und Wissenschaft bei Hermann Cohen/Philosophy and Science in Hermann Cohen, Springer International Publishing Cham 2018.

1104 Paul Natorp, Platos Ideenlehre, Eine Einführung in den Idealismus, Hamburg 2004 (1903); Hermann Cohen, Platons Ideenlehre und die Mathematik, Marburg 1878; as far as I know, Cassirer did not write a specific work on Plato, but he devoted much time to an in-depth study of the works of Marsilio Ficino, Nicolaus Cusanus, Gemistus Pletho, and Basilios Bessarion and their re-orientation to Plato's thinking during the Renaissance (which was indeed a "renaissance" of Plato's ideas). He commented on this as follows: "To describe the battle over Plato vs. Aristotle in its full scope and in the full depth of the conceptual opposites would be to write the history of modern thinking. This antagonism has prevailed and has remained determining until far into the most original achievements of modern philosophy" (Ernst Cassirer, Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit, Band I, Darmstadt 1995, p. 80.) The essential works by Cohen, Natorp, and Cassirer on the philosophy of René Descartes have already been referred to.

generally, the consistent reference to reason and understanding as the unshakable agencies of the necessary and the universal. If we extend the range beyond the *Critique of Pure Reason* – foregrounded here because this study has been conducted from the overall epistemological perspective of the *visual turn* – to include the *Critique of Practical Reason* and the *Critique of the Power of Judgment*, the impression we gain and which holds for *Kantianism* and *Neo-Kantianism* alike is quite clearly that of a *philosophy of reason*, of *rationality*, rather than of sense experience, the particular, accidental, existentialist, emotional, irrational. Helmut Holzhey therefore consequentially describes the main thrust, or motto, of Neo-Kantianism by saying that "*neo-Kantians seek to demonstrate and ensure the rationality of culture*," and in my view, the Marburg School clearly and distinctly adhered to this motto.[1105] At the same time, they duly rehabilitated the masterminds of *rationalism*, while their intensive study of geometry and mathematics bears witness to a distinct effort to make Kant's system, conceived of as a *philosophy of experience*, the *reference philosophy of the sciences*.

According to the timetable proposed by Klaus Köhnke, the emergence of *Neo-Kantianism* as the philosophy that intended to both return to and extend Kant's doctrine happened in three phases: the first phase, essentially starting with Hegel's death (1831), was marked by the rejection of German idealism by university philosophy; it was followed by a phase where the Neo-Kantian program was beginning to take root (1849–1865); and, then, by the phase of its growing prevalence and the rise of *Neo-Kantianism* as the leading philosophical movement at the German-speaking universities (1865–1881).[1106] By 1875, *Neo-Kantianism* had become the established name of this new school of thought,[1107] and a broad Neo-Kantian movement had formed at the universities of the German-speaking area. Also, it should not be forgotten that in the 19th century, as W.J. Mander has so excellently described,[1108] English universities, too, were under the sway of Kant's and Hegel's philosophy, just as, to a greater or lesser extent, the universities of many other European countries. Then, in the late 19th century, positivism rose to become the main rival of Neo-Kantianism, effectively taking the credit for the scientific and technological progress of the time and imposing a perception of Neo-Kantianism as

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1105 Helmut Holzhey, Der Neukantianismus als historische Erscheinung in: Helmut Holzhey, Wolfgang Röd, Geschichte der Philosophie Bd. XII, Die Philosophie des ausgehenden 19. und des 20. Jahrhunderts 2, p. 37.

1106 Klaus Chr. Köhnke, Entstehung und Aufstieg des Neukantianismus, Frankfurt/M. 1993, p. 5–7.

1107 Helmut Holzhey, loc. cit., p. 30.

1108 W.J. Mander, British Idealism, Oxford University Press, Oxford 2014.

a cultural philosophy that was out of touch with reality and divorced from the sciences.

Otto Liebmann's book "*Kant und die Epigonen*" (1865) is usually referred to as the signal event that triggered the *Neo-Kantian* turn in Germany. Here, the essential pro-Kantian arguments were formulated, by a twenty-five-year-old scholar, in a way which obviously appealed to the public, if in a somewhat simplifying way. The first chapter presented Kant's main doctrine as well as his major shortcomings (according to Liebmann), while the following chapters dealt with the flaws of the subsequent systems of *Fichte*, *Schelling*, and *Hegel*, then *Herbart*, then *Fries*, and, finally, *Schopenhauer*, each of them culminating in the mantra-like formula: "*So, back to Kant*. ('Zurück zu Kant')"[1109] This is worth mentioning here because this pivotal text already highlights one of *Neo-Kantianism*'s basic requirements as well as basic problems. First of all, there is the logical premise of any renewal movement, namely the need to, first, work out the real core, the indispensable and essential elements of Kant's philosophy and, then, primarily and following from this, to identify those elements that should be updated or revised. This is closely linked to the second problem of *how* and along what lines those elements which were found to be insufficient, questionable, or inconsistent by the respective critic should be replaced or revised. So, the call "*Back to Kant!*" needs to be complemented by a second call – "*Forward with Kant!*" –, for otherwise one risks getting stuck in historical preservation, or in infighting among schools, and loses one's grip on the advances of science. A simple example: in accordance with a view that was wide-spread at the time, Liebermann states in his text that Kant's *thing-in-itself* is one of those critical points that should be set aside if there was to be any progress at all. But opinions may differ in this respect, for in my view, any appreciation of this key element of the *Critique of Pure Reason* – and, with it, the "*critical limit*" as such – depends on the perspective from which one considers the concept of *thing-in-itself*, and on the exact understanding one has of it. So, let's briefly discuss this as an example of how difficult and how complex the question of the correction or revision of Kant's philosophy really is.

If one understands the *thing-in-itself* to be an object which has been projectively "objectified" *in advance* and to which, under the premise of its projected thingness, one ascribes a causal effect on the senses while, at the same time, one is supposed to be unable to understand it in its totality, then there indeed seems to be an inconsistency and unbreachable gap in Kant's doctrine. It must be borne in mind, however, that with such an approach, one has always already *tacitly gone beyond the critical limit* – has

[1109] Otto Liebmann, Kant und die Epigonen, Stuttgart 1865.

always already presupposed perfect knowledge and, consequentially, the totality of the properties and effects of this object beyond its appearance – since, otherwise, one would not be able at all to qualify, based on this premise, the causal effect as a sensation of precisely this kind. But Kant clearly states that the object "*affects the mind in a certain way*," which is correct in its very vagueness, and that we can therefore only ever recognize the things in their appearance in the way they appear to us, that is, in the way we configure and interpret them. Consistently thought through, this argumentation is not as unreasonable as it might seem, for one would find it much more disconcerting, or indeed impossible, if someone claimed to have an exact knowledge of the sun, at any given moment, with all its molecules, atoms, radiation particles, orbital motions, gravitational potential as compared to all other heavenly bodies, etc. Even a die-hard positivist is unlikely to claim any such thing, in particular since atoms and subatomic particles per se are not visible and since, as previously explained, the question which is by now increasingly raised would rather be: "What remains of particle physics?"[1110] Which is closely linked to a second question, namely: what, then, do we really know about the sun?

The answer is that the sun is a *thing* we are in some ways quite familiar with, which "*affects the mind in a certain way*," that is, a thing which we have since early childhood been used to perceiving in its diurnal light and temperature cycles – whose "acquaintance" (in Russel's and Moore's words) we have made. At the same time, however, as set forth by Descartes, we can approach the sun by our "*natural light*," our innate reason, i.e. by logical considerations, geometric calculations, and technical devices. "The sun" obviously exists, nobody would deny it (within the 8-minutes limit), we grasp it to the best of our ability in terms of sensibility and understanding, we comprehend its physical principles, and in our cognitive process we can each day extend our experience with and, primarily, knowledge about the sun as suggested by the phenomena at our disposal. And yet we will never, at least not in a finite time, be able to know the *thing-in-itself*, that is, the sun at *any* given moment in *all* its atoms, radiations, and particles. Not by any stretch of the imagination can I see a disconcerting problem or irreconcilable contradiction in any of this, so I would never exceed the "*critical limit*" which Kant has set and which marks the difference between his doctrine and Hegel's claim to absoluteness. Which means that, unfazed, I'll resume my sunbathing in the "thing-in-itself" even though my actual knowledge about it covers a mere *fraction* of the totality of possible knowledge. An observation by Kant in his pre-critical work "*Dreams of a Spirit-Seer*" allows us to get an idea of the

[1110] Michael Esfeld (ed.), Philosophie der Physik, Frankfurt/Main 2013, esp. p. 118, 150, 158.

reflections which may have induced him to develop the concept of "thing-in-itself":

"*For certainly there is in nature no object known to the senses of which it can be said that one has ever exhausted it either by observation or by reason, not even if it were a droplet of water, or a grain of sand, or something even simpler* (here, quantum physics springs to mind, and the question, increasingly raised today: "What remains of particle physics?") – *so measureless is the complexity of that which nature, in the least of its parts, presents for analysis to an understanding as limited as that of man*.[1111] (my parenthesis)

Even though this is not yet the carefully worked-through exposition of the concept of "thing-in-itself" which Kant subsequently offers in the *Critique*, it nevertheless suggests the perspective from which he approached the problem of the "critical limit." In an argumentation not unlike the one I have previously tried to develop, Friedrich Albert Lange summarizes Kant's point of view in the *Critique* as follows:

"'*What the things may be in themselves I do not know,' Kant says in the chapter On the Amphiboly of the Concepts of Reflection, 'and also do not need to know, since a thing can never come before me except in appearance. (…) Observation and analysis of the appearances penetrate into what is inner in nature,' that is, the law-based interconnections of the appearances, 'and one cannot know how far this will go in time.'*"[1112]

I have slotted in this brief and rather simplifying discussion only because the "*thing-in-itself*" constitutes the very skandalon – or, rather, alleged skandalon – of Kant's philosophy that sparked off most of the criticism and became the driving force behind many an effort to revise, or "overcome," Kant's philosophy, not least by quite a number of well-meaning epigones. But as one can see for oneself, this idea, central for Kant if, perhaps, easier to convey in terms of the "*critical limit*," is not only essential for the architectonic of the *critical-idealist* doctrine in general but turns out to be quite comprehensible and defensible as long as one does not start out from a tacit preemptive, "reification" of the concept of the object.

For Neo-Kantianism, this would necessarily raise the question of whether those exponents who disregarded or sought to "overcome" this "critical limit" had not actually opted out of Kant's philosophy as such and had indeed turned away from Kant rather than revised and updated him! This is the very issue that Kurt Walter Zeidler deals with, if in the

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[1111] Immanuel Kant, Dreams of a Spirit-Seer Elucidated by Dreams of Metaphysics (1766), in: Immanuel Kant, Theoretical Philosophy, 1755–1770, Cambridge University Press 2002, p. 338f.

[1112] Friedrich Albert Lange, Geschichte des Materialismus und Kritik seiner Bedeutung in der Gegenwart, Bd. II, Frankfurt/M. 1974 (1875), p. 499f.

context of the theory of objective validity, in his comprehensive synoptic diagnosis of the historical schools of Neo-Kantianism:

"*… for while Neo-Kantianism eliminates all psychology-of-faculties elements of Kant's architectonic, on the one hand, it does not, as German idealism did, seek to replace these elements by a speculative genetization of the a priori, on the other. As a consequence, Kant's systemic architectonic, being essentially based on the parallelization of logical and psychological structures, collapses*."[1113]

As a consequence, there is the requirement for any Neo-Kantianism that it cannot rightly claim to be true to and continue reasoning in the Kantian spirit unless it makes sure that none of the *essential cornerstones* of "*Kant's systemic architectonic*" are eliminated or deformed and, thus, lead to its "*collapse*."

In addition, there is another complex of elements in Kant's philosophy which need revising because during his lifetime, there was little if any knowledge about them, or which can be put down to political pressure or "zeitgeist." If Kant were alive today, how would he conceive certain chapters of his "Anthropology," his lecture on the "Races of Human Beings", his psychological reflections, etc.? So, while there are, as previously mentioned, logical-systemic elements such as, for instance, the categorical imperative, synthetic a priori judgments, the categories, the critical limit, etc., which are atemporal and have lost nothing of their validity, there are also domains where a modification, an update, a revision seems more feasible and called for than in others, the reason being, quite simply, that today many things and scientific facts are much better understood. One such issue where a revision, or "update," is indeed crucial is the entire domain of *vision*, that is, Kant's *theory of perception* whose grounding, as I have tried to show, was unsound because of his reliance on Locke's and Hume's flawed epistemology, and which is, therefore, badly in need of "repair." Another issue that has drawn similar criticism is Kant's understanding of classical logic, Euclidean geometry, mathematics, Newtonian physics, physiology, etc., which reflects the views of his time but is no longer consistent with the modern-day state of knowledge in the respective fields. Also, Kant was, of course, bound to certain social standards and religious principles that defined the societal framework of his day, which he indeed extended to the limits of contemporary state tolerance (see Letter from the King, 1794!) but could not shake off altogether. Just as with Descartes, Christian religion exerted a significant influence on the social and intellectual life of his time, to which the philosophers, too, submitted to a certain extent and which may indeed have left its traces in

[1113] Kurt Walter Zeidler, Kritische Dialektik und Transzendentalontologie, Der Ausgang des Neukantianismus und die post-neukantianische Systematik, Bouvier Bonn 1995, p. 71.

Kant's presentation of the transcendental dialectic (God, the soul, etc.). Thus, in contrast to the elementary cornerstones of Kant's philosophy, there are domains where, from a modern-day perspective and in light of the most recent insights of science, certain corrections seem possible, and would indeed make sense, *without compromising the guiding systemic principles, the elementary cornerstones of Kant's architectonic*. At the same time, this could be a meaningful *criterion* for any revision and modernization of Kant's philosophy, namely to preserve its critical-idealist approach but try to update it by examining and incorporating the most recent insights of modern science and, thus, keep abreast of contemporary developments. In the last years, however, there seems to be an increasing interest to find new perspectives and topics resonating with contemporary questions. Good examples are volumes like *Neo-Kantianism in Contemporary Philosophy* (2010) edited by Rudolf Makkreel and Sebastian Luft or *New Approaches to Neo-Kantianism* (2015) edited by Nicolas de Warren and Andrea Staiti.

### What are the indispensable guiding principles and elements of Kant's philosophy for a modern Neo-Kantianism?

A careful examination of the literature on *Neo-Kantianism* reveals a host of historical overviews, biographies, and commentaries on individual schools, here primarily the Marburg and the Southwestern Schools, their exponents, and their works. But at least until quite recently, no explicit attempt had been made to *clearly* and *distinctly* define the *indispensable* core of Kant's philosophy that any modern, up-to-date neo-Kantian movement should adhere to, and those parts of it which really need updating, or revising, or even correcting in a more general way. It is true that there is a certain consensus among commentators concerning the general thrust of Neo-Kantianism, crystallized in Helmut Holzhey's dictum that "*neo-Kantians seek to demonstrate and ensure the rationality of culture*." Or, if one would rather have it more concrete, there is Hans-Ludwig Ollig's suggestion that the "*inner center*" of Neo-Kantianism consists of "*two closely connected moments*": the "*priority of epistemology as the methodological form*" and the "*priority of culture as the content of philosophical criticism*."[1114] But even in this more concrete description, mathematics and physics and those theory-of-science components one can't ignore if one wants to do justice to Kant's Newton-inspired philosophy of experience are conspicuously absent. Kurt Walter Zeidler accounts for the "complex nature" of any assessment of Neo-Kantianism by saying that "*post-Kantian transcendental philosophy … was completely taken up by the search*

[1114] Hans-Ludwig Ollig, Der Neukantianismus, Stuttgart 1979, p. 4.

*for Ariadne's thread in this tangle of metaphysical, theory-of-science, logical, and psychological approaches*."[1115] There have, of course, been attempts at renewal, undertaken in a variety of ways. But as often as not, they were the byproduct of responses to attacks from other philosophical schools and currents – cases in point being the debates about the validity of *Euclidean geometry* as a basis of spatial perception in Kant, or about synthetic and analytic judgments, or the modernization of classical logic which Kant – if one ignores his transcendental-philosophical approach – started out from. Kant's tables of judgments, in particular, have given rise to plenty of criticism, or discussions.[1116] Gottfried Gabriel comments:

"*Of all the parts of Kant's doctrine, the classification of the forms of judgment has met with the least approval from subsequent authors.*"[1117]

The debate as to whether this criticism, especially in the form of Frege's critique, is well-founded and whether or not the table of categories as well as their number and the structure of the forms of judgment are defensible, goes far beyond the scope of the present study. I tend to agree with Michael Wolff in this respect, who not only shows that Kant's presentation is defensible in light of today's modern logic, but even provides evidence

"*… that all of Frege's objections are based on a number of fundamental and consequential misunderstandings, or contain some quite elementary errors that concern the capacity of the logical system of the Begriffsschrift and, therefore, affect the concept of logic itself.*"[1118]

What has not yet been worked out in its pure form, however, is a *positive definition* of those *indispensable* and *elementary* components of Kant's philosophy that would be valid for any philosophy that wants to call itself *neo-Kantian*. For as Wilhelm Windelband so aptly said in his 1883 *Präludien*: "*Understanding Kant means going beyond Kant.*" But this "*going-beyond*" is, of course, an ambivalent undertaking, for going beyond something also means walking away from something – and Kant conceives of

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[1115] Kurt Walter Zeidler, Kritische Dialektik und Transzendentalontologie, Der Ausgang des Neukantianismus und die post-neukantianische Systematik, Bouvier Bonn 1995, p. 17.

[1116] Here, the classics are: Klaus Reich, Die Vollständigkeit der Kantischen Urteilstafel, Hamburg 1986; Michael Wolff, Die Vollständigkeit der kantischen Urteilstafel: Mit einem Essay über Freges Begriffsschrift, Frankfurt/M. 1995; Reinhard Brandt, Die Urteilstafel. Kritik der reinen Vernunft A 67–76; B 92–101. Kant-Forschungen Band 4, Hamburg 1991; Johannes Heinrichs, Die Logik der Vernunftkritik – Kants Kategorienlehre, Tübingen 1986; and many more.

[1117] Gottfried Gabriel, Windelband und die Diskussion um die Kantischen Urteilsformen, in: Marion Heinz/Christian Krijnen (eds.), Kant im Neukantianismus – Fortschritt oder Rückschritt?, Würzburg 2007, p. 91.

[1118] Michael Wolff, Die Vollständigkeit der kantischen Urteilstafel: Mit einem Essay über Freges Begriffsschrift, Frankfurt/M. 1995, p. 5.

the *Critique of Pure Reason* as a closed architectonic system, thoroughly thought through, flawless in itself, brought to completion by the two other "*Critiques*," and precluding any attempt to isolate certain parts or elements and replace them by others as one might see fit. This is, of course, a serious problem and may well have contributed to the failure of the entire historical movement. But actually, by his B-edition reformulation of important passages of the *Critique of Pure Reason*, e.g. his significant revision of the function of the *imagination* and his terminological redefinition of various functions and faculties, Kant himself provided the key to this problem and demonstrated *that* and *how* change is possible. So, as long as they serve and preserve the basic idea of the *Critique*, meaningful revisions within the overall framework of Kant's architectonic are indeed admissible – as demonstrated by Kant himself!

But before determining and defining those core elements and systemic cornerstones of the Kantian architectonic which are *indispensable* and must be *retained* if a philosophy is to be described as truly neo-Kantian, I propose to work out a first group of relevant elements and motives by examining the initial *dissociations* that mark the emergence of Neo-Kantianism. Due to the subject of the present study, however, my focus will be on the epistemological aspects of the *Critique of Pure Reason*, which means that I cannot cover the entire scope of the issues addressed in the three *Critiques* and that the cultural philosophy of the Southwestern School, for instance, will go underappreciated. As a *guideline* for ascertaining the attractive and retainable elements of Kant's philosophy, I will in the following trace the positive arguments for a return to Kant: what, in each case, was the reason for wanting to go "back to Kant," and what were the philosophies and movements that Neo-Kantianism explicitly wanted to *dissociate* itself from? It is well-known that initially, the return to Kant constituted a rejection of Hegel's philosophy, prevalent in Germany at the time, and in particular of the Hegelian philosophy of science which had turned out to be virtually non-workable. By the mid-1900s, this was coming to a head because the dramatic and obvious *scientific and technological progress* in all fields posed a serious problem for a philosophy that sought to remain the unifying and guiding principle of all sciences. This conflict-cum-adaptation continued throughout the entire epoch of Neo-Kantianism and is arguably the most significant of its characteristics, namely the drive to preserve the *critical-idealist* core, i.e. the method and system of Kant's philosophy, while taking stock of and incorporating the potential of new, research-based scientific knowledge so that the current state of the art could be brought to fruition for Neo-Kantianism without compromising its critical-idealist orientation. Hans-Ludwig Ollig emphasizes that

"*… younger Neo-Kantianism [needed] first of all to come to terms with the revolutions in the various scientific disciplines. … Here, great merit is due to Cassirer, in particular, and his 'subtle adaptation of the original Kantian categories to the new sociology and linguistics, but also the new type of Einstein-Planckian physics.'*"[1119]

By combining a *rationalistic core* with a theory of perception that was based on *sense data*, Kant had founded a *reason-oriented, critical-idealist philosophy of experience* which steered clear of any lapse into the depths of empiricism and materialism, on the one hand, and precluded the production of idealist-metaphysical pipe dreams, on the other. Werner Flach defines this *critical* core principle which is so important especially for Neo-Kantianism as follows:

"*The self-definition of Kantian philosophy as a critical philosophy is here understood to the effect that along with its insistence on an ultimate grounding in theory, there is also the requirement that its own reasons and its own structures of justification for all that is non-theoretical be made clear.*"[1120]

Now, in a first step, let's try to distil, from the *dissociations* from other philosophers and schools of thought, the fundamental characteristics and elements of Kant's philosophy which account for its *appeal to Neo-Kantianism*, while keeping in mind the above-quoted "*own reasons and (…) own structures of justification for all that is non-theoretical*":

1. *Dissociation from Hegel's idealism* as well as from certain forms of *metaphysical idealism*.
2. *Dissociation from materialism* (see Friedrich Albert Lange's critique of materialism), yet *commitment to a philosophy of experience* (see Hermann Cohen's "Theorie der Erfahrung" (1885) or Cassirer's theory-of-science writings).
3. *Dissociation from empiricism/positivism*, yet a *philosophy of the sciences* (notwithstanding the need for revision in certain fields, e.g., incorporation of non-Euclidean geometry; Helmholtz', Fechner's, Müller's physiology of perception; modern logic – see the respective attempts made by Natorp in "Die logischen Grundlagen der exakten Wissenschaften," as well as by Cassirer, etc.). Manfred Pascher comments on this situation:

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[1119] Hans-Ludwig Ollig, Der Neukantianismus, Stuttgart 1979, p. 3; the quotation is from: Siegfried Marck, Am Ausgang des jüngeren Neukantianismus. Ein Gedenkblatt für Richard Hönigswald und Jonas Cohn, Archiv für Philosophie 3 (2):144 (1949).

[1120] Werner Flach, Kants Begriff der Kultur und das Selbstverständnis des Neukantianismus, in: Marion Heinz/Christian Krijnen (eds.), Kant im Neukantianismus – Fortschritt oder Rückschritt?, Würzburg 2007.

"*Thus, Kant's position suited all those who welcomed the turn towards the natural sciences but refused the reductionist tendencies of the wide-spread materialist schools*."[1121]

Holzhey characterizes the common thrust of neo-Kantians from 1875 onward as follows:

"*They turned against naturalism or materialism, against so-called 'clericalism' and against the pessimistic school*."[1122]

With this, we can add a number of further schools that were objects of dissociation, namely:

4. *Naturalism* – to which one might add the beginnings of *positivism*, although in the German-speaking area the latter was received via Hume rather than Comte. Alois Riehl's position is a border case in this context, since he thinks of himself as a Kantian but sees Kant, in a way, as a continuation of English empiricism by other means (loc. cit., p. 35).
5. *Clericalism.* – "*Neo-Kantians*," to once more quote Holzhey, "*seek to demonstrate and ensure the rationality of culture.*" This commitment to a *culture of rationality* and *reason* automatically entails *a dissociation from religious* and *irrationalistic* philosophies and schools, in later times primarily from *life philosophy*, *prefascist thinkers*, *Nietzsche*, as well as *Heidegger* (Davos 1929).
6. The *pessimistic school*, that is, obviously, *Schopenhauer*.

Now, before examining the indispensable elements of Kant's philosophy filtered out by means of these dissociations, I propose to identify, taking the characteristic schools of *Neo-Kantianism* as a basis, those of Kant's fundamental ideas which were considered in need of *renewal or correction* by each of these schools. This could also result in a good indicator of the very elements which are in need (or perhaps only assumed to be in need) of *renewal or correction* in Kant's system itself. Relying on T.K. Oesterreich's revision of Friedrich Überweg's (1923) history of 19th-century German philosophy, Kurt Walter Zeidler lists the following Neo-Kantianism schools,[1123] for each of which I have provided a brief commen-

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1121 Manfred Pascher, Einführung in den Neukantianismus, München Fink 1997, p. 40.

1122 Helmut Holzhey, Der Neukantianismus als historische Erscheinung in: Helmut Holzhey, Wolfgang Röd, Geschichte der Philosophie Bd. XII, Die Philosophie des ausgehenden 19. und des 20. Jahrhunderts 2, p. 35.

1123 Kurt Walter Zeidler, Kritische Dialektik und Transzendentalontologie, Der Ausgang des Neukantianismus und die post-neukantianische Systematik, Bouvier Bonn 1995, p. 70, – T.K. Oesterreich, (1923), Die Deutsche Philosophie des 19.

tary to highlight the essential point of Kant's doctrine which the respective school found in need of modification:

1. The *physiological* school (Helmholtz and Lange) – which called for a stronger focus on the *real-world, natural conditions of man*, primarily in the field of the theory of perception as well as for a more explicit acceptance of the *dispositionally innate nature of a priori forms and functions* (the forms of space/time; categories).
2. The *metaphysical* school (Liebmann, Volkelt) – which argued for a strengthening of the *idealist* element and the role of the individuality of the subject and refused to primarily conceive of Kant's doctrine as a philosophy of science.
3. The *realistic* school (Riehl) – which wanted to see Kant as a continuation of empiricism and to move away from the *idealist core* and from *Ich-philosophy* towards a neo-Kantian realism.
4. The *logicistic* school (Cohen, Natorp, Cassirer) of the Marburg School – which pushed back Kant's *empiricist tendencies* ("the given"), firmly placed him in a historical line with *Plato* and *Descartes*, insisted on the central role of *mathematics and geometry*, and sought to establish Kant's critical-idealist transcendental philosophy as the reference philosophy of the *sciences* without relinquishing the practical aspect, the "rationality of culture" (Natorp: Die logischen Grundlagen der exakten Wissenschaften, 1910; Cohen: Das Prinzip der Infinitesimal-Methode und seine Geschichte, 1883; Cassirer: Zur Einsteinschen Relativitätstheorie, 1921, Die Philosophie der symbolischen Formen, 1923–29).
5. The *theory-of-value criticism* (Windelband, Rickert, Münsterberg) of the Southwestern School, including Bruno Bauch and Emil Lask – which promoted a *philosophy of values* and *culture* that aspired to be more than a mere *philosophy of science*, and worked hard on a renewal of the categories.[1124]
6. The *relativistic restructuring* by Simmel – which, in my view, is not part of this context at all.
7. The *psychological* school (following Fries, Bona Meyer, Nelson) – which argued that Kant's treatment of the *faculties* was too theoretical and abstract and that *thought processes* should be explained *in psychological terms*.

Kurt Walter Zeidler, then, quite rightly asks why thinkers such as Vaihinger, Erdmann, Paulsen, Husserl, and many more should not be counted

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Jahrhunderts und der Gegenwart, 4. Teil von Friedrich Überwegs Grundriß der Geschichte der Philosophie, Berlin 1923.

[1124] e.g. Emil Lask, Die Logik der Philosophie und die Kategorienlehre, Tübingen 1993 (1923); Wilhelm Windelband, Vom System der Kategorien, Tübingen 1900.

among the neo-Kantians, but since in the present context, I am not interested in a comprehensive historical presentation of Neo-Kantianism and its transitions and forms, I will bypass this important question. At any rate, we could *ex negativo* establish the potential *deficiencies* or *breakpoints* in Kant which provided the above-listed thinkers and schools with the starting points for their renewal or transformation projects or their *minimizing of those tendencies* in Kant which they found undesirable. Thus, in an effort to erase any suggestion, in Kant's writings, that a priori structures, or at least their basis, might be *innate* Riehl, as previously shown, even resorted to the use of incomplete quotations. The aim here was to make Kant's doctrine compatible, as far as possible, with the empiricist tradition. The exponents of the Marburg School, on the other hand, went to great effort to establish a logical line from Plato and Descartes to Kant although the latter had rather sought to keep his distance from these precursors. At any rate, the strategy of looking into neo-Kantianism's *dissociations* from other schools, on the one hand, and those elements of Kant's architecture of reason which were found in need of *reformation or renewal*, on the other, has allowed us to establish a number of essential points which can now be further investigated.

## Deducing the attractive and retainable elements of Kant's architectonic from Neo-Kantianism's dissociations from other schools

Let's begin with the essential dissociations which characteristically elucidate what constitutes the attractiveness and the common denominator of the neo-Kantian schools and motivated their "Back to Kant!":

*1. Dissociation from Hegel's idealism*: Kant's philosophy is a system that foregoes any claim to the absoluteness of the mind coupled with the identity with the Being (objective idealism) but, due to the "critical limit," always remains in touch with sense data and experience. Thus, Kant's philosophy is a *transcendental idealism* and can, as such, fulfil a workable guiding function for the sciences. A "total transparence" of the object is precluded by the "critical limit," or the doctrine of the *thing-in-itself*. Any philosophy which claims to be a continuation of Kant's doctrine must therefore retain the *transcendental basic structure* and the *critical-idealist systematic*. However, as a consequence of the principled dependence on sense data, problems may arise with respect to the presentation of reason and the *ideas* – conceived of as "*positive regulative principles*"[1125] by Kant – in the *Transcendental Dialectic*. These problems, however, were compen-

[1125] Rudolf Zocher, Kants Grundlehre – Ihr Sinn, ihre Problematik, ihre Aktualität, Erlangen 1959, p. 14.

sated for by the attractiveness, in the age of science, of a *philosophy of experience* which avoided the fatal disruptions and inconsistencies of EAN. In the 20th century, the problematic nature of Kant's conception of *idea* and *reason* caused prominent neo-Kantians to reorient themselves to Hegel and dialectic reasoning – see, e.g., Siegfried Marck, "Die Dialektik in der Philosophie der Gegenwart" (1929/1931); Heinrich Levy, "Die Hegelrenaissance in der deutschen Philosophie" (1927); and even Cassirer, whose *Philosophy of Symbolical Forms* occasionally resonates with a definite Hegelian note;[1126] while Richard Kroner, in one of the most brilliant studies on this subject, even refers to a transformation "Von Kant bis Hegel" (1924). From this dissociation, the following essential elements for any form of Neo-Kantianism can be deduced, it must meet the following criteria:

*a)* *Philosophy of experience*
*b)* *Transcendental basic structure*
*c)* *Transcendental idealism – critical limit*, or the doctrine of the *thing-in-itself*. The *dependence of ideas* (*reason*) *on the understanding* counteracts metaphysical pipe dreams and is at all times orientated to the concrete world of a human being.
*d)* The *position of the idea* in Kant as a regulative idea raises certain systemic problems which led to the 20th-century Hegelian renaissance.

*2. Dissociation from materialism*:

a) Here, the focus is primarily on Kant's *critical idealism* which was uncompromisingly defended by virtually all exponents of Neo-Kantianism. In F.A. Lange's words:

"*Consciousness cannot be explained by material motion. However cogently it is presented as definitely depending on material processes, the relation between external motion and sensation remains incomprehensible, and as for elucidating it, the brighter the light, the sharper the contrast.*"[1127]

b) *Critical limit*: Perception remains dependent on sense data and is based on the physiological conditions of man (intuition and affection), but *synthesis* by the power of imagination and the *inter-*

[1126] See Ernst Wolfgang Orth, Hegelsche Motive in Windelbands und Cassirers Kulturphilosophie, or Christian Krijnen, Absoluter oder kritischer Standpunkt, Das methodisch genetische Problem des Anfangs der Philosophie bei Hegel und Rickert in: Detlev Pätzold/Christian Krijnen (eds.), Der Neukantianismus und das Erbe des deutschen Idealismus: die philosophische Methode, Würzburg 2002.

[1127] Friedrich Albert Lange, Geschichte des Materialismus und Kritik seiner Bedeutung in der Gegenwart, Bd. II, Frankfurt/M. 1974 (1875), p. 455.

*pretation* of the "material" provided by the senses nevertheless remains a *function of the understanding* (although, in my view, and given the insights of *vision science*, this is insufficient as an explanation); it is not a "direct" copy of the material environment but does not negate it, either.

c) *Transcendental realism*: By positing the real-world environment of things ("Sachen") as the uncircumventable starting point of his system, Kant remains a "realist" and, in contrast to what some exponents of EAN wrongly insinuated, does not construct a system that is metaphysically detached from reality. At the same time, however, this reality is in its *appearance* determined by the mind in accordance with its laws and categories, so this is still *transcendental idealism*. Rudolf Zocher referred to a "*peculiar connectedness of 'empirical realism' and 'transcendental idealism'*" in this context (loc. cit.).

d) The *critical limit* (thing-in-itself) puts a stop to any naïve or overly enthusiastic attempts to believe in any perfect, presuppositionless knowledge about the external world as posited by naturalism, materialism, and realism, therefore this is a *critical idealism*.

*3. Dissociation from empiricism/positivism*:

Here, while similar considerations as in the case of materialism apply, there is the additional sharp *dissociation* from *empiricism/positivism* with respect to the following conflict issues:

*a)* *Self-conscious I* – transcendental apperception as the "headstone" (grounded by Descartes) of the Kantian system, towards which all experience must be oriented but which, due to the *mechanism of self-deception*, is denied or simply overlooked by EAN (as repeatedly demonstrated in the above).

*b)* *Synthetic a priori judgments*, which are required so that the ongoing, categories-enabled bringing-together, in the *synthesis*, of sense data and concepts in view of the *self-conscious I* is capable at all of going beyond known concepts, something which *analytic judgments* are incapable of. *Analytic judgments* proceed by the principle of contradiction, as Paul Natorp pointed out, thus acting like a magnifying glass which "*only broadens the distances between the elements of the object one sees but does not reveal anything new in it*."[1128] EAN believes that it can make do with analytical judgments because due to the *mechanism of self-*

[1128] Paul Natorp, Die logischen Grundlagen der exakten Wissenschaften, Leipzig/Berlin 1910, p. 19.

*deception*, it assumes to be able to simply *copy* things and, therefore, dispense with synthesis.

c) The *rationalistic a priori core* of the Kantian doctrine, which is anchored in the *a priori given forms of the intuition,* i.e. *space and time*, as well as in the *categories of thinking*.

4. *Dissociation from naturalism*, which is largely identical with that from *materialism/positivism*.
5. *Dissociation from clericalism, irrationalism, existentialism,* the philosophies of *pre-fascism, Nietzsche, and Heidegger, as well as from Schopenhauer's pessimism* which is grounded in *irrationalism* and, ultimately, an *Indian-Buddhist philosophy of suffering* – a dissociation which is the logical consequence of:
   a) *Neo-Kantianism's commitment to the ascertainment and safeguarding of the rationality of culture*, as well as to a *practical, anti-fundamentalist Enlightenment humanism* based on understanding and reason;
   b) the *logically consistent architectonic system* which by these very properties fundamentally differs from (post-modern) illumination and patchwork philosophies.

Thus, based on the *dissociations* of *Neo-Kantianism* from other contemporary philosophies, we have filtered out those elements of Kant's philosophy which allow us to positively define the indispensable value of his system:

1. The basic orientation of *Neo-Kantianism* is defined by its will "*to demonstrate and ensure the rationality of culture*" – which holds for all three *Critiques*, although I have confined myself to the *Critique of Pure Reason* in the present study. Following Kant, neo-Kantianism is conceived of as a consistent *architectonic system* which must be both *critical* and *self-grounded*, that is, must not contain any dogmatic elements, or elements incapable of being grounded.
2. *Neo-Kantianism* retains the *transcendental structure* and is, therefore, a *philosophy of experience* – which means that understanding and, by extension, reason as regulative ideas remain dependent on *sense data* no matter how badly Kant's empiricism-inspired theory of perception may be in need of revision and correction. Therefore, neo-Kantianism can be the *reference philosophy of the empirical sciences*.
3. *Neo-Kantianism* adheres to Kant's *critical-idealist approach* and the established *critical limit* notwithstanding the criticism frequently leveled at the theory of the *thing-in-itself*. With this, neo-Kantianism dissociates itself from objective idealism and its claim to absoluteness, as well as from all varieties of EAN.

4. *Neo-Kantianism* is a combination of *transcendental realism* and *transcendental idealism*, that is, it conceives of the mind as spontaneous, creative, free, and independent as well as irreducible, in any linear, analogous, and one-dimensional way, to material givens. As Kant himself explained the "*transcendental idealist*" can be a "*dualist, i.e. he can concede the existence of matter without going beyond mere self-consciousness and assuming something more than the certainty of representations in me, hence the* cogito, ergo sum" (CPR A 370). The *self-conscious I* is the headstone of the system, it is the *subject*.

*Neo-Kantianism*, just as rationalism, retains the focus on *geometry and mathematics* as the standout disciplines of *synthetic a priori* thinking, the *synthetic a priori nature of judgments*, and the *a priori forms of space and time*, the latter being defended, at all times, as an important component of Kant's doctrine at least by the exponents of the Marburg School, and in particular Ernst Cassirer until his death in 1945, even against thinkers of the caliber of an Albert Einstein.

## Deducing potential corrections of Kant's architectonic from the different currents of Neo-Kantianism

Pursuing the strategy previously outlined, I will now use the different neo-Kantian schools to ascertain those points in Kant's system that have turned out to be in need of revision or correction, in short, of thinking with Kant beyond Kant:

1. The *physiological* school: This critique, partly put forward by Helmholtz and F.A. Lange, is very important for the present study and has already been abundantly discussed in various contexts. The progress achieved in the fields of medicine, biology, genetics, and other life sciences, calls for:
   a) A *vision science-centered update of such knowledge as is relevant for the theory of perception in Kant*. This will affect the *forms of the intuition*, i.e. *space and time*, as the innate forms of our perception as well as, e.g., the function fulfilled by the gestalt laws of perception already at the level of the intuition.
   b) In the light of Noam Chomsky's insights into the "deep structure" of language and the ever more comprehensive insights concerning innate knowledge and dispositionally innate faculties, the question of the *natural* bases of our knowledge has become virulent. From my point of view, as already discussed in the respective chapter, nothing would change in the architectonic of Kant's system if the *forms of the intuition*, i.e. *space and time*,

and the *categories of the understanding* were also assimilated as *dispositionally innate*, genetically transmitted *functions of thinking*, provided we make sure that this will not result in "*a kind of preformation system of pure reason*" (CPR, B 167) where thinking would no longer be the activity of a spontaneous, creative mind. Not unlike in Descartes, I don't think there would be any contradiction here at all, for there should after all be a way, in this day and time, of explaining – without recourse to God or to some mythical agency as the alleged originator of our faculty of thinking – how to "*pursue the pure concepts into their first seeds and predispositions in the human understanding, where they lie ready, until with the opportunity of experience they are finally developed*" if there were no such seeds!

2. The *metaphysical school*: This school preferred to not think of Kant's philosophy primarily as a reference philosophy of the sciences and was, most notably, skeptical that some "*panlogism*" might result from the prevalence of a "*rationalistic epistemological principle*" that would not take due account of "*contingency*" and the "*obscure roots of our existence*."[1129] From a present-day perspective, however, this doesn't make sense because the objective today is, rather, to reestablish *Neo-Kantianism* as the reference philosophy of the sciences – there is no lack of irrationalism, anyway.
3. The *realistic* school: From this perspective, the points in Kant that require adaptation and a more up-to-date treatment are the recourse to God, the soul, and contingency.[1130] In contrast, typical points of EAN criticism such as, for instance, synthetic a priori judgments, the thing-in-itself, the impossibility of a "direct" access to the world ("veil of ideas"), concern the indispensable elements of Kant's philosophy and can, therefore, not be a subject of change. In contrast, novel insights of cognitive research could help to elucidate the subjective part, that is, the *how* of thinking, while keeping in mind F.A. Lange's previously quoted objection concerning the fundamental independence of thinking from its neurological bases.
4. The *logicistic* school: In the context of the Marburg School, there is a real treasure trove of valuable work that aims to:
   a) Rethink Kant's philosophy in terms of a *realignment with Plato and Descartes*, and, associated with this:
   b) Emphasize the central importance of *mathematics and geometry*, as outlined in the philosophy of rationalism.

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1129 Johannes Volkelt, Immanuel Kant's Erkenntnistheorie nach ihren Grundprincipien analysirt, Leipzig 1879, p. 235ff., p. 275.

1130 Immanuel Kant, Critique of the Power of Judgment, Cambridge University Press 2000, § 77.

c) *Correct the empiricist bias of Kant's model of perception*. Here, with his research oriented to *gestalt theory* and *Lie Transformation Groups*, Ernst Cassirer was on the right track in a pioneering attempt to reconcile epistemology, gestalt theory, the geometry of perception, and the "grammar of vision" with *critical idealism*.

d) Hermann Cohen, for whom Plato always remained the true fixed star of the philosophical galaxy and whose "*Philosophie der reinen Erkenntnis*" was centered on the *theory of judgment*, primarily sought to strengthen the rationalistic elements, reject the empiricist "given," and enhance the *theory of categories*.

5. The *theory-of-value criticism*: strengthening the emphasis on *value-based and cultural criticism* à la Hermann Lotze[1131] was an essential move beyond Kant but is less crucial for my more theory-of-science and epistemological approach here.

   a) *Kant's table of judgments and his construction of the categories* suggest that there might be another point worth revising in Kant. Just as with Cohen, Windelband's and Lask's *re-adaptation of the categories* emphasizes that Kant's theory of categories might be in need of revision and extension. However, there are a number of very detailed recent studies which come to the conclusion that the *Kantian table of judgments* and the type and form of the *forms of judgment* are indeed defensible even from the point of view of a modern logic of quantifiers.[1132]

6. The *psychological* school: while the *study and elucidation of the psychological laws of thought*, as in problem-solving and the gaining of insight, is not really a main interest of Kant's logical-transcendental approach, it should nevertheless not be prematurely dismissed since it can indeed help to identify cognitive patterns. While this is not of fundamental importance from a logical point of view, it can nevertheless contribute to the elucidation of basic anthropological patterns "*from the human standpoint*."

With this, we are now in a position to complement the five previously established *positive elements of any Neo-Kantianism* by those domains of Kant's epistemology that were deemed in need of *extension or correction* by historical Neo-Kantianism:

1. *The theory of perception*: as I have already set forth by way of preparation in the respective chapter, the theory of perception that underlies

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1131 e.g. Hermann Lotze, Logik, Leipzig 1843; Metaphysik, Leipzig 1979.

1132 Michael Wolff, Die Vollständigkeit der kantischen Urteilstafel: mit einem Essay über Freges Begriffsschrift, Frankfurt am Main: Klostermann 1995, p 241f., p. 307f.

Kant's epistemology needs to be radically updated in terms of *vision science*. This particularly includes a) the *passive-receptive* concept of *sensibility,* b) Kant's concept of *intuition* insofar as it is supposed to be already able to *give* "*objects*" to us, c) the position and function of the *imagination*, which needs to be clarified. Such a revision could help to strip *Neo-Kantianism* of the flawed if seemingly attractive empiricist influences of the past and to downgrade the epistemic status of "sense experience" to what it already was for Plato and Descartes.

2. *The undetermined, hazy status of the innate (the "natural acquisitions")*: if *Neo-Kantianism* is not to leave the exponentially developing field of *nativism* entirely to naturalism and scientism, the a priori structures of thinking which Kant believed to be able to "*pursue (…) into their first seeds and predispositions in the human understanding, where they lie ready, until with the opportunity of experience they are finally developed*" must be carefully incorporated into the Kantian doctrine without compromising its critical-idealist, transcendental architecture. What is at issue here, rather than "*innate concepts*," is dispositionally innate knowledge, the "*seeds and predispositions in the human understanding*" that will develop "*with the opportunity of experience*." Since a priori knowledge was already clearly and distinctly accepted as our *innate* "*natural light*" by Plato and, then, Descartes, this would realign Kant with the "golden thread" of rationalism.
3. *The Transcendental Aesthetic* is coherently conceived in accordance with its basic idea. But it is incomplete and should be complemented by the *innate laws of gestalt* and *Lie Transformation Groups* – the "*grammar of vision.*" Three-dimensional space and time are not the only pre-established forms of human perception, there also is the "*grammar of vision*" which, from the very first rays of light that hit the retina, always already interprets and processes our sensory impressions. Thus, *gestalt laws* and *Lie Transformation Groups* belong to the a priori forms of our knowledge along with its spatial and temporal organization, which – in Kant's own words – "*co-ordinates all sensations according to a law which is stable and which is inherent in the nature of the mind*."
4. *The categories and the forms of judgment*: these were obviously deemed to be in need of revision although, from my point of view, the various attempts of the neo-Kantian schools did not lead to a clearly superior or more comprehensive result, nor were all their methods internally consistent. If we go by Michael Wolff's very detailed study,[1133] we can, as previously stated, accept Kant's organiza-

[1133] Michael Wolff, Die Vollständigkeit der kantischen Urteilstafel: mit einem Essay über Freges Begriffsschrift, Frankfurt am Main: Klostermann 1995.

tion and number of the categories as complete and defensible. If we conceive of them as the basic logical laws of our thinking, a priori given and fixed, it would make sense – for the reasons given so far, and provided one subscribes to an evolutionary line of development which, today, is beyond dispute – to proceed from the *grammar of vision* to *universal grammar* to a "*grammar of thought*" as suggested by Ernst Cassirer. In my view, this problem is solvable, and highly interesting, but exceeds my possibilities here by far.

5. *The concrete, psychological-scientific presentation of thought processes*: even though these approaches are "merely" psychological rather than philosophical, their elucidation could nevertheless serve to better understand the nature of *rational insight* and the *how* of grasping as well as the *necessity* implied by it, potential examples being the aha effect and certain problem-solving methods, as previously discussed. This would again be in accord with modern science.

With this, in addition to the five retainable *positive core elements*, we have ascertained five elements of Kant's a critical-idealist architecture which have been considered worth revising or updating and can now be subjected to closer examination. This will allow us to develop a first outline of what a modern, scientifically up-to-date *rationalistic Neo-Kantianism* might look like after the *visual turn*.

## The *visual turn* and a rationalistically modernized Neo-Kantianism

Before using the criteria elaborated so far to draw up a proposition, or blueprint, for a modernized *Neo-Kantianism* that abides by the rationalistic tradition, I propose to once more return to the essential points that have emerged from the previous description of historical *rationalism* so as to make it quite clear, once again, in which respects and to what extent Kant's philosophy would be affected if the rationalistic elements of his system were re-foregrounded. To this end, let me refer to a very appropriate if more general characterization of the essential elements of *rationalism* by John Cottingham. The four points I emphasize for the sake of more clarity, the emphases are all Cottingham's:

"*In the history of rationalism we find a similar cluster of features.*

*a) One strand is* innatism, *which is itself a complex cluster of notions involving the idea that the mind is equipped from birth with certain fundamental concepts or with knowledge of certain fundamental truths.*

*b) Another strand is* apriorism – *the belief in the possibility of arriving at knowledge independently of the senses.*

*c) Another strand is* necessarianism – *the notion that philosophy can uncover necessary truths about reality*."

My fourth point is taken from another commentary by Cottingham which concerns *sense experience* because this subject is, of course, important for the *visual turn*, although the basic idea is already implicitly contained in the second point of the aphorism:

"*d) …while conceding that* sensory experience *is in some sense necessary for the development of human knowledge,* (rationalists) *nevertheless insist that it can never be sufficient in itself.*"[1134] (my parenthesis)

This brief summary indicates the essential elements that characterize *Descartes*' reasoning as well as, basically, already that of *Plato*. I have added point d) because EAN literature keeps insisting that *sense experience* is ignored or dismissed as an illusion in rationalism. This is wrong, of course, as I have by now repeatedly shown. For *sensory experience* is the indispensable *starting point* of any cognition of objects, and yet certain *necessary* and *general* "productions" (Cohen) must already take place with the very first incoming rays of light, failing which there would be no cognition at all. There must already exist a *unified*, *self-reflective I* in view of which all sensory experiences are structured and organized, there must already exist a *fixed structure* of cognitive *functions* (be they called categories, simple natures, or ideas) *BEFORE* the sensory experiences are received, and this structure of functions must be unitary, and exist in virtually the same form and functionality in every subject, since otherwise cognition would be entirely subjective, arbitrary, and incapable of being intersubjectively communicated. Descartes calls this structure of functions the *innate* "*natural light*," man's innate reason, the "*seeds*" of which are always already sowed in the mind and begin to "sprout" on the occasion of relevant sensory perceptions and constellations. And just as a grain of wheat will invariably grow into wheat, we will invariably think in terms of these elementary functions when dealing with a problem or a question and, therefore, impose their laws on the phenomena.

## The rationalistic nature of Kant's doctrine

As a first step of the following attempt to outline a rationalism-oriented Neo-Kantianism, I will present a comparison between this foundational structure of characteristic basic elements of *rationalism* and the structure Kant relies on in his *Critique of Pure Reason*, which will allow me to come to a clear conclusion as to whether, in terms of content, there are any radical and fundamental differences or conflicts between them or whether, on the contrary, they are largely consistent.

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[1134] John Cottingham, Rationalism, Paladin Books, London 1984, p. 9 and p. 6.

a) *Innatism*: this point has been comprehensively discussed in the chapter entitled "The concept 'innate' in the philosophy of Immanuel Kant," with the result that on the surface, it may appear that Kant rejected all nativist elements, described as "*innate concepts*," in his doctrine. But so does Descartes who, as far as I can see, *never* definitely claimed that concepts such as "raspberry ice cream" are innate. Kant, at any rate, suggests – as any careful reading of his argumentation will confirm – that at least "something" is innate. Let's once more take a look at the two critical passages from Kant, already quoted in the respective chapter, which are time and again referred to as evidence that Kant had rejected nativism:

"*For sensations, while exciting this action of the mind, do not enter into and become part of the intuition. Nor is there anything innate here except the law of the mind, according to which it joins together in a fixed manner the sense-impressions made by the presence of an object.*"[1135]

So, Kant unequivocally and literally says: "*Nor is there anything innate here except the law of the mind, according to which it joins together in a fixed manner the sense-impressions made by the presence of an object*." What can a (literally!) "*innate law*" – which is already more than a rule or a disposition – mean if not that we dispose of innate laws of perception and thinking? Kant says so quite unequivocally and literally here, I can't see how this could be denied or reasoned away!

In the second passage, also previously quoted, from the famous controversy with Eberhard, Kant literally states:

"*The Critique admits absolutely no implanted or innate representations. One and all, whether they belong to intuition or to concepts of the understanding, it considers them as acquired. But there is also an original acquisition (as the teachers of natural right call it), and thus of that which previously did not yet exist at all, and so did not belong to anything prior to this act. According to the Critique, these are, in the first place, the form of things in space and time, second, the synthetic unity of the manifold in concepts; for neither of these does our cognitive faculty get from objects as given therein in-themselves, rather it brings them about, a priori, out of itself. Here must indeed be a ground for it in the subject, however, which makes it possible that these representations can arise in this and no other manner, and be related to objects which are not yet given, and this ground at least is innate.*"[1136]

Here, Kant literally speaks of "*an original acquisition*," which is a somewhat vague expression for a structure which must already exist, i.e. be innate – there is no conceivable alternative. These, Kant says, "*are, in the*

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[1135] Immanuel Kant, Inaugural Dissertation of 1770, in Immanuel Kant, Theoretical Philosophy 1755–1770, Cambridge University Press 1992, p. 400.

[1136] Immanuel Kant, On a discovery whereby any new critique of pure reason is to be made superfluous by an older one (1790), in: Immanuel Kant, Theoretical Philosophy after 1781, Cambridge University Press 2002, p. 312.

*first place, the form of things in space and time*" (I suppose he means the appearances, or the form in which we perceive things, rather than their objective form, as set forth in the Transcendental Aesthetic), "*second, the synthetic unity of the manifold in concepts; …*" But to "*bring […] them about, a priori, out of itself*," he says, there "*must indeed be a ground for it in the subject, however, which makes it possible that these representations can arise in this and no other manner, and be related to objects which are not yet given*," from which he concludes, literally, that "*this ground at least is innate*." Here again, Kant clearly concedes that there are innate preconditions of our a priori cognition, although the expression "*original acquisition*" cannot really be described as a paragon of precise philosophical terminology. So, there is a certain congruence here, if somewhat lacking in terms of clarity and distinctness.

b) *Necessarianism*: At any rate, what can be retained from the above is that according to Kant, there actually is "something" innate ("*original acquisition*") which "*makes it possible that these representations can arise* in this and no other manner, *and be related to objects which are not yet given*" (my emphasis). This, however, is the core of what Cottingham defines as *necessarianism*, for this insight of rationalism indeed means that due to our innate functions and dispositions – in deference to Kant, let's simply describe them as "*innate ground*" or "*original acquisitions*," whatever it is that he wanted to describe or gloss over by this – we can gain *universally* and *necessarily* valid, structured, and organized knowledge, just as Plato had first realized some 2,300 years ago. In Kant, as I have already explained, this *necessarianism* is actually much more pronounced than in Descartes since Kant always speaks of *laws* (if in the context of the transcendental mode of cognition) where Descartes is concerned with rules, the creative mind, and methods.

c) All these points are, of course, in harmony with Kant's *apriorism* which ultimately means that *sensory impressions* alone can never generate laws for us to follow, and that the understanding must always add, combine, synthesize something if we are to be able to cognize things and gain knowledge.

d) "*Sensory experience … can never be sufficient in itself*": finally, we have to consider the point, referred to above, that *sense experience* alone – postulated as the one and only source of knowledge and repeated, mantra-like, under the name of experience in empiricism and, ultimately, EAN – can never suffice to warrant the universality and necessity of knowledge. In this respect, due to Kant's orientation to *empiricism*, his theory of perception and epistemology contains certain weak points and inconsistencies, which shall be discussed in the following. But, here again, let's keep a sense of perspective. For if it is true that in the A edition of the *Critique of Pure Reason*, but also in some of his later works, Kant's start-

ing point is the *passive reception* of the "*raw material of sensible impressions*," it is also true that he later leaves no doubt, as Friedrich Kambartel or Kurt Walter Zeidler have rightly pointed out, that this empiricism-inspired starting point needs to be overcome:

"*But although our cognition commences with experience, yet it does not on that account all arise from experience. For it could well be that even our experiential cognition is a composite of that which we receive through impressions and that which our own cognitive faculty (merely prompted by sensible impressions) provides out of itself, …*"[1137]

Although references to the "*given*" will keep turning up in Kant, he has nevertheless found a means to adequately re-position it in his epistemology by introducing the concepts of the manifold and the synthesis of the imagination. So, if we allow for some margin in our reading of Kant, just as the Anglo-American literature does in their readings of Locke and Hume, there is no doubt that a *clear* and *distinct* correspondence with all four of the essential elements, outlined above, of *rationalism* can be ascertained! And from this it logically follows that in terms of content, Kant's doctrine is largely in accordance with the core elements of *rationalism*, even without further adaptations or the need to "think beyond" him.

## Five points in Kant's doctrine which should be modernized in a rationalistic Neo-Kantianism

Against the background of this essential *consistency between* Kant's doctrine and the doctrine of *rationalism*, and taking into account the following five points which should be indispensable for any true, albeit modernized, neo-Kantian philosophy:

1. *Demonstrating and ensuring the rationality of culture*,
2. *Transcendental structure* and, following from it, *philosophy of experience* and *reference philosophy of the sciences*,
3. *Critical-idealist approach* and *critical limit*,
4. Connectedness of '*empirical realism*' and '*transcendental idealism*' (R. Zocher),
5. *Synthetic a priori* approach, grounded on *geometry and mathematics*, *synthetic a priori nature of judgments*, *a priori forms of space and time*,

we can now set about evaluating those points in Kant's doctrine which, from a modern-day perspective, are worth updating, and at the same time reflect upon where and how to incorporate them into Kant's doctrine.

[1137] Immanuel Kant, Critique of Pure Reason, Cambridge University Press 1998, p. 136 (B 1).

The five major epistemological issues previously deduced from the renewal efforts of historical Neo-Kantianism were:

1. *Kant's theory of perception*
2. *The undetermined, hazy status of the innate* (*"natural acquisition"*)
3. *The table of categories and the forms of judgment*
4. *The concrete, scientific-psychological description of the thought processes*.

These four points will now serve as a guideline for my argumentation, but priority will be given to those issues that are relevant for my topic since a discussion of the categories would, of course, go far beyond the scope of the present study. All I can do in this respect is outline the new solution path.

*Transformation ad 1:*
*Kant's theory of perception*

Here, given the current state of knowledge of *vision science*, there is a number of erroneous assumptions in Kant – already repeatedly discussed – which primarily concern his assertions about *intuition*, *affection*, *passive sensibility*, *the given*, etc. However, considering the 18th-century state of knowledge in these fields, this can hardly be retrospectively held against him. Nevertheless, it is important to incorporate modern scientific insights in order to correct those elements, previously highlighted, in Kant's theory of perception which are due to his reliance on the flawed *empiricist* theory of perception, and to re-instate its full rights to the rationalistic element. Thus, already Kant's way of introducing his theory of perception in the *Transcendental Aesthetic* of the *Critique of Pure Reason* (and even in the B edition!) causes some uneasiness since his choice of words and his argumentation are strongly reminiscent of EAN terminology:

> "*In whatever way and through whatever means a cognition may relate to objects, that through which it relates* immediately *to them, and* at which all thought as a means is directed as an end, *is* intuition. *This, however, takes place only insofar as* the object is given to us*; but this, in turn, is possible only if it* affects the mind in a certain way. *The capacity (*receptivity*) to acquire representations through* the way in which we are affected by objects *is called sensibility, and it* alone affords us intuitions: but they are thought through the understanding, *and from it arise* concepts." (CPR, B 33 – my emphases)

Here the critical points, as highlighted in the above quotation:

1. Kant's description of the *intuition* as the perceptual level where objects are "*given*" to us by "*affect[ing] the mind in a certain way*."

2. The passive mode (*receptivity*) that is supposed to define our form of perception (sensibility), with representations allegedly depending on "*the way in which we are affected by objects*".
3. The assumption that "*objects are given to us*" already at the lowest level of perception, and that this mode "*alone affords us intuitions*" which are nevertheless supposed to already represent individual objects.

I will leave aside Kant's observation that the intuition of objects is that "*at which all thought as a means is directed as an end.*" For one can, of course, also think about abstract relations, behaviors, character traits, where objects or sensory impressions per se play no role at all. What is particularly problematic in this passage is Kant's assumption that "*objects*" are "*given to us*" already by the *intuition*, that is, at the level where we are *immediately* affected by them although, at this level, it is quite impossible to distinguish completely configured, finished objects in the initial field of vision by their spatio-temporal organization alone. A second point is that objects are supposed to be "*given to us*." The impression one gets is that objects, finished as they *appear* to be, give themselves actively to us (just as Democritus argued that the images, "eidola," emanated from the objects). Occasionally, Kant's wording also suggests that *individual* objects (albeit organized in the forms of space and time) can be *directly looked at*, with "looked at" used in the very sense it has in everyday language. Accordingly, the Transcendental Aesthetic states:

"*That representation, however, which can only be given through a single object, is an intuition*." (CPR, A 32)

Since Kant makes no mention at all of the entire productive and constructive work of the imagination in this context and gives no thought to the structure of the initial field of vision, the impression we get is that it is possible for us to simply *look at* individual objects. Kant:

"*The effect of an object on the capacity for representation, insofar as we are affected by it, is sensation. That intuition which is related to the object through sensation is called empirical. The undetermined object of an empirical intuition is called appearance.*
*I call that in the appearance which corresponds to sensation its matter, but that which allows the manifold of appearance to be intuited as ordered in certain relations I call the form of appearance. Since that within which the sensations can alone be ordered and placed in a certain form cannot itself be in turn sensation, the matter of all appearance is only given to us a posteriori, but its form must all lie ready for it in the mind a priori, and can therefore be considered separately from all sensations.*" (CPR, B 34)

1. What strikes one here is that Kant speaks of the *effect* which an empirical *object* has qua *sensation*, which is strongly reminiscent of Gassendi and Locke, whereas at this level of perception, no definitely configured objects can as yet be "seen" at all.

2. Kant then partly makes up for it by introducing the term of *appearance* as well as the foundational concept of the *manifold* where the forms that "*must all lie ready for it in the mind*" organize the *matter of the sensations* into relations. By being seen through the forms of space and time, the object is supposed to become "intuitively accessible," which, however, is not possible at all without the workings of the gestalt laws and the numerous other laws of the "grammar of vision."
3. All this creates the impression that there are *objects* which can be simply *looked at*, as if they were finished images, and that it is only afterwards that synthesis happens!

Now, let's contrast Kant's assumptions with the insights of modern *vision science*. Here, the "*impossibility of perception*" has become a basic concept: the insight that due to the "*inverse problem*"- that is, the fact that for every act of seeing there is, in principle, an infinite number of possible interpretations -, visual perception, "seeing," *cannot be a passive act of copying* reality and that this reality is *not* a "*given.*" Rather, seeing is a multileveled, extremely complex process where already the physical stimulations of the retina are processed and transformed so as to make us represent a *hypothetical visual image* which we *construct*, through *interpretation*, in accord with the laws of the "grammar of vision." These constructed images provide a highly probable interpretation of visible reality which *as such*, however, does not exist in the "visual images" configured by us. This means that no objects are ever *given to us* but that we actively construct, in accordance with certain laws, a *hypothetical visual image* where structures are *actively* introduced and objects are *actively* configured by our perceptual system. *There is no direct intuition that is given to us by objects* or, inversely, that *gives objects to us*! Insofar, Kant had to a certain extent let himself be taken in by the empiricists' mistaken theory of perception. Let's also call to mind Ken Nakayama's statement which already conveys a certain idea of the *highly dynamic, active* mode of "seeing":

"*One of the most striking things about our visual experience is how dramatically it differs from our retinal image. Retinal images are formed on the back of our eyeballs, upside down; they are very unstable, abruptly shifting two to four times a second according to the movements of the eyes. Moreover, retinal images are sampled very selectively; the optic-nerve fibers that send information to the brain sample more densely from the central area than from peripheral portions of our retinae. Yet, the visual scene appears to us as upright, stable, and homogeneous. Our perception is closely tied to surfaces and objects in the real world; it does not seem tightly related to our retinal images.*" [1138]

[1138] Ken Nakayama, Zijiang He, Shinsuke Shimojo, Visual Surface Representation: A Critical Link between Lower-level and Higher-level Vision, in: Stephen Kosslyn, Daniel Osherson (eds.), Visual Cognition, Vol 2, Bradford Book MIT 1995, p. 1.

So, what we perceive is distinct even from the physically created image on the retina. No *direct* or analogous perception whatsoever results from these "stimulations of the retina" (Quine); rather, what we see *exclusively* consists of *interpretations* of the field of vision. *Objects* can never "*give*" themselves to us in this way. The continual interpretive work of perceptual cognition already sets in with the very first rays of light that hit the retina, if not even before that if we factor in the eye's adaptative functions. This is why we today speak of the "*impossibility of perception*," very descriptively summarized by Brian Scholl:

"*Visual perception is the process of recovering useful information about the structure of the world, based on the shifting patterns of light that enter the eyes. Perhaps the most fundamental fact about visual perception is that this task is, strictly speaking,* impossible. *That is, the shifting patterns of light that enter the eyes* are insufficient by themselves to fix the structure of the external world from which that light was reflected or emitted *(Marr, 1982), because there are always a multitude of possible structures in the world that could have given rise to those same patterns of light.*"[1139] (my emphases)

In this sense, however, modern *vision science* confirms the theoretical assumption that underlies Kant's doctrine of the *thing-in-itself*: for reasons of principle alone, we can never *directly* and *immediately* recognize objects "such as they are." Even when we see familiar objects (objects we are "acquainted" with), we are only ever able to produce interpretations and constructions against a certain mental and cultural background.

Finally, let's once more recall Mark Wagner's studies on the geometry of seeing and his findings that even the perception of very simple objects is never as unambiguous, *direct*, and trivial as EAN would have it:

"*Despite of the claims of Gibsonian Naive Realism (Gibson, 1979), our perceptions often do not match physical reality under very ordinary circumstances. Even under full-cue, naturalistic conditions, distance, area, angle, and volume judgments are transformed by power functions that generally do not have exponents precisely equal to 1.0. In addition, the in-depth dimension of visual space typically evinces an affine transformation relative to the frontal dimension. Under reduced-cue settings (which generally occur at least once a day in the natural world), these distortions are even more pronounced.*"[1140]

Thus, even the simplest objects cannot be perceived, even under highly standardized conditions, in an analogous copying mode and in always the same way. However, Kant has to a certain extent underpinned his argu-

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[1139] Brian Scholl, Innateness and (Bayesian) Visual Perception, in: The Innate Mind, (Eds.) Peter Carruthers, Stephen Laurence, Stephen Stich, Oxford University Press, Oxford/New York 2005, p. 40f.

[1140] Mark Wagner, The Geometries of Visual Space, Psychology Press, New York / Hove 2012, p. 223.

ment by stating that the objects affect us "*in a certain way*," which means that while he adheres to the flawed *passive* EAN mode, he is noncommittal as to how the process of perception actually happens.

We have furthermore seen that modern *vision science* has incorporated the insights of *gestalt theory*, namely that there are standardized patterns or schemata in accordance with which our visual cognition from the very start modifies and processes our sensory impressions of the environment. Broken lines are closed, "good," simple Euclidean figures are preferentially perceived as compared to complicated, asymmetrical, fragmented ones. With motion, still other laws – of *grouping*, of *common fate*, etc. – come into play, as previously described. These laws of vision, or preferential interpretive patterns, including those that lead to optical illusions, are largely *innate*, or only partly acquired, and can in their totality be conceived of as the *grammar of vision* (Richard Gregory). We have also already explained that the functionality of these interpretive patterns is oriented, as already discussed by Ernst Cassirer, to *Lie Transformation Groups* which preferentially rely on Euclidean figures.[1141] The insight that our perception tends to prefer *Euclidean forms* bears out Kant's argumentation in that the *form* of our perception follows the three-dimensional spatial pattern of *Euclidean geometry*. That certain "gestalt laws" guide the *configuration* of objects from the field of vision is anticipated in terms of the *figurative synthesis* of the revised B edition of the *Critique of Pure Reason*, but, as explained in the previous chapter, the position and function of *imagination*, *synthesis*, and *schematism* remain ambiguous even in Kant's B-edition presentation, and differ depending on the perspective taken, i.e. "*top-down*" vs. "*bottom-up*."

If we now contrast all the points thus re-summarized with Kant's epistemology, the result, in my view, is as follows: just as Descartes long before him, Kant was clearly and distinctly aware of the *interpretive mode* of our perception, and his presentation of it in the context of the activities of the *imagination* is, in principle, correct. This holds for his starting out from the *manifold* as an undetermined initial field of vision that is spatio-temporally organized but needs structuring by the *figurative synthesis* of the *imagination* before meaningful objects, or at least structures, of the outside world can be represented at all, as well as for the need for *intellectual synthesis* to step in so we can come to a category-guided, *concept-based* organization of this representationally structured perception. Also, as a function, *figurative synthesis* is, in principle, strongly reminiscent of the laws of gestalt. However, as I have already pointed out, Kant's positioning of the concept of the *manifold* comes at "too late" a stage of the

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[1141] Peter C. Dodwell & Terry Caelli (eds.), Figural Synthesis, Lawrence Erlbaum Associates, Hillsdale 1984; Peter C. Dodwell, The Lie transformation group model of visual perception, Perception & Psychophysics 1983, 34 (1), 1–16.

visual process, as evident by his example of the room "*piled high with pictures and decorations*." For the very fact that the pictures on the walls are already identified and labeled as such and are supposed to be unorganized until they "go through" the imagination misses the very essence of the real process, namely that even these pictures must already have been productively configured in the "primal scene" of the field of vision. Only then can the subsequent step described by Kant (*intellectual synthesis*) happen at all. Kant thought that the forms of time and space already sufficed to structure the *intuitions* so that we could *look at* an *object* as a particular one, but as a way of giving forms to phenomena, this is simply inadequate.

Finally, what remains to consider is *visual thinking*, which Kant implicitly describes in the *schematism* of the imagination but fails to identify as a specific *faculty* because he discusses *schematism* from the perspective of *conceptual* judgments (from "above") and is, thus, unable to realize that *even at the preconceptual level*, *universal* structures or features are already worked out in the consciousness! We have seen that Kant describes this faculty as "*intellectual on the one hand, sensible on the other*," and for someone who tends to be precise to a fault when dealing with concepts, it is highly unusual, if not inadmissible, to assign a faculty to *two* domains – sensibility and conceptual understanding – which he had previously juxtaposed in the strongest possible terms. Here, I can only recur to the argument that this "*incommunicable silhouette*," this "*wavering sketch, as it were, which mediates between various appearances*," is the synthetic work of the figurative imagination where concepts are not yet involved in any direct way but which is nevertheless a faculty that already enables us to form *general representations* of objects.

I strongly feel that without this faculty, humans might never have been able to develop *universal concepts*, for all they would ever have in their minds' eye would be individual, particular images, just as argued by Berkeley and Hume. So, this image-generating function of the *imagination* must be capable of "recognizing" – as a "*wavering sketch, as it were, which mediates between various appearances*" – the *universal* in those essential and universal traits that make up our representations, e.g. the *essential traits inherent* to all stags, and of visually "condensing" them in such a way that any reason-endowed human being can recognize them as such, just as they recognize the stag in the road sign "wild animals crossing," or the two crossed bars that signify a crossroads. But this general validity and universal recognizability is, in turn, only possible if the configurative laws of the *categories* are already involved in this "*procedure of the imagination*," for, otherwise, we would only ever be able to filter out certain accidental, random traits of the particular stag we just saw, rather than the *essential, ideal-type traits* of a schema. Therefore, our conscious-

ness must be able to grasp, with *necessity*, the *universal* of many empirical views and representations in their *ideal-type essence*, i.e. in the "*wavering sketch, as it were, which mediates between various appearances*," and to largely strip it of any *accidental* particularities even *before* the *concept* "steps in." For, otherwise, the *universal* could not be filtered out from the many individual and particular traits so that nothing accidental is left in the respective figure, just as none of the details of a photographical representation is left in the stag shown on the road sign, for instance, but only the ideal-type traits, recognizable to everyone, and the movement of the animal – a "*monogram*" of the schema. This procedure of *universal representation* is, thus, already *discursive* even though it is still a purely visual process!

Building on this insight, there is a last point to be considered, namely that we are not only capable of visualizing individual empirical objects as ideal-type prototypes even before the concept steps in, we can also, as previously described, turn and rotate them in the eyes of the mind (see the works of Shepard & Metzler)[1142] and "go through" functional solutions of problems *in the eyes of the mind* without needing a concept to do so (see the works of T. Helstrup & R.E. Anderson, as quoted). Even though this holds only for elementary mechanical processes, these processes were nevertheless the very activities which for hundreds of thousands of years ensured the survival of mankind. I have described this primitive, technical thinking as an *understanding of function*, that is, as a *pre-stage* of visual thinking and, ultimately, conceptual thinking, which is nevertheless sufficient for us to solve simple mechanical problems before the level of conceptual problem-solving is even attained. Early humans, being obviously capable of purposive activities without language, witness to this primitive form of *visual thinking*. The further development of the *understanding of function* into *visual thinking* has been discussed in the chapter on "*thinking without language*," cases in point being chess, the positive outcomes of deaf subjects on a series of tests, and geometry where even relatively complex problems can be solved by visual thinking without recourse to language-based reasoning. Enhancing, complementing, and correcting Kant's theory of perception in these respects would lead to an absolutely up-to-date and defensible *neo-Kantian* theory of perception, which would be fully consistent with the sciences without compromising the five core elements, listed above, of Kant's doctrine. Thus, the elements to be adapted in Kant's doctrine would be:

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[1142] Roger N. Shepard and Jacqueline Metzler, Mental Rotation of Three-Dimensional Objects, Science, New Series, Vol. 171, No. 3972 (Feb. 19, 1971), pp. 701–703.

1. The conception of a *passive and receptive sensibility*

An overall summary of the findings of modern *vision science* clearly shows that perception is, from the very first moment, a quintessentially *active* process of interpreting and reconstructing the infinite number of possibilities contained in the appearing thing-in-itself and the structures-in-themselves of our environment. *So, this needs to be corrected in Kant: the sensibility is from the start to be conceived of as active rather than passive-receptive*!

2. The *intuition* and the *manifold*

Kant's concept of *intuition* is basically inconsistent. It cannot provide a *direct* and *individual* image of the object since even as a phenomenon, the object would not be figuratively marked out in the field of vision at this stage. *So, this needs to be corrected in Kant:* the concept of *intuition* needs to be completely revised. There can be no *intuition* of an individual object prior to the workings of the figurative imagination which structures the *manifold* so that this figurative processing becomes possible, in the first place. The spatio-temporal organization alone, as proposed by Kant in the Transcendental Aesthetic, is insufficient for "*intuiting*" individual objects! Thus, between the as yet entirely undetermined field of vision and the *manifold* in the Kantian sense (the room already "*piled high with pictures*" (i.e. objects!)) which needs to be "gone through" and organized in an object-oriented way, more sub-steps are required than those described for the synthesis in Kant's Deduction, as shown in the following.

3. Incorporating the *laws of gestalt*, *Lie Transformation Groups*, *and all the laws pertaining to the* "*grammar of vision*," into the Transcendental Aesthetic

Kant's Transcendental Aesthetic quite rightly acknowledges three-dimensional space and time as the *forms* of the intuition which always already determine the organization of human perception. As the *innate* forms of our perceptual cognition, this is easy to incorporate into a rationalistic Neo-Kantianism without the slightest incompatibility with the critical-idealist approach, the *things-in-themselves*, or the transcendental orientation of Kantianism. Furthermore, the laws of gestalt, the forms of Lie Transformation Groups, and all the innate laws of perception still to be discovered, being no less uncircumventable conditions of any human perception, must be added to the forms of space and time because they account for the active, spontaneous image processing which makes the seemingly effortless intuitions possible, in the first place. Even though Kant conceived of these intuitions as resulting from a passive and recep-

tive process, this is inadequate from a modern-day point of view. *So, this needs to be corrected in Kant:* the *laws of gestalt*, *Lie Transformation Groups*, and all the laws pertaining to the "*grammar of vision*" need to be added, in the *Transcendental Aesthetic*, to the forms of space and time!

4. Taking into account the *understanding of function*

As repeatedly discussed in the course of this study, our faculty to represent three-dimensional objects in the mind's eye goes beyond a mere "turning and rotating" of them. By handling objects in the mind's eye, human beings are able to not only conceive of novel arrangements of objects or structures but to solve simple technical problems even before the concept "steps in," and sometimes to do so even faster and more efficiently than by conceptual-linguistic thinking. Thus, they can carry out purposive activities that are grasped in purely visual terms, such as, for instance, using a lever. *So, this needs to be corrected in Kant:* the *understanding of function* needs to be taken into account in the transition from the imagination to the understanding but (from the "bottom-up" perspective) before *visual thinking* and, then, conceptual thinking, for it is a faculty that enables humans to solve simple technical problems and is, thus, *pre-conceptual* insight.

5. Taking into account *visual thinking*

So, let's get to the heart of this study – *visual thinking*. In a first step, I have shown that the *logical inner core of the concept* which, according to Kant, is the *rule* that is inherent to it, originates from the general, figurative "condensation" of the general traits of an object in the *general representation* in *which it is, in keeping with its nature, already realized*. Already at this preconceptual level, just as in the *schematism* and Kant's excellent description, repeatedly quoted, of the *general representation* as a "*wavering sketch, as it were, which mediates between various appearances*," our visual thinking is able to identify the *essential, ideal-type traits* of many individual empirical objects and summarize them in an image, that is, "condense" and represent the *nature*, or *essence*, of these objects without the need for a concept of whatever kind. We form a *model*, as Ernst Cassirer put it.

This is proof that the *universal*, that is, understanding and reason, has its roots *in this* "*visual condensation*" of the general, schematic, model-like traits of an object!

The *understanding of function* and *visual thinking* are, then, further steps in the evolution of this faculty because besides condensing the essential traits of visual representations into universal representations, they enable

us to deal with *motion* and, over time, even carry out primitive logical operations in the imagination (… *when* the object is rotated like this, *then* the lever snaps into place). It is from these elementary thought processes of the *understanding of function* that *visual thinking* which allows for rather complex and intelligent reflections to be carried out in a purely visual form and without the involvement of concepts can be assumed to have developed. As shown in the chapter on "thinking without language" – examples being the solving of non-trivial problems by deaf adolescents, lightning-fast thinking in chess, and problem-solving procedures in geometry –, *visual thinking*, which must have developed from the *understanding of function* but is already logical, if non-linguistic, *thinking*, is an essential, ongoing form of thinking that *complements* conceptual thinking and can outperform it since it is faster and, in certain problem-solving contexts, even more efficient. Since *visual thinking* operates *visually*, on the one hand, and *logically*, on the other, that is, can form judgments and even draw conclusions from these judgments, it seems plausible to assume that the categories – at least those of *quantity*, *quality*, and *relation* – are already at work in *visual thinking*, as well. A more in-depth investigation will be presented in the further course of this study. *So, this needs to be corrected in Kant*: *visual thinking* must be incorporated as a faculty into the chapter on *schematism* in Kant's doctrine at a point after the *understanding of function* but still *before conceptual thinking*.

*Transformation ad 2*:
*The "grounding" of the a priori in dispositionally innate knowledge*

As shown in the chapter on innate knowledge, there is widespread agreement in the sciences today that a wide variety of human capacities and human knowledge is dispositionally innate, as Plato – albeit in mythical terms in accordance with what was thinkable at that time – and, for modern philosophy, Descartes had already perfectly realized. So, a "*grounding*" of the *a priori forms of space and time* – strangely "suspended in mid-air" in Kant –, but also of the *functions of thinking* which Kant, to avoid being branded as a dogmatic, rather vaguely describes a "*original acquisitions*," is badly needed. This is imperative because, firstly, nativism is by now so solidly substantiated by scientific evidence that even die-hard empiricists of the likes of Peter Carruthers strike the flag of empiricism in this matter, albeit seeking at the same time to re-hoist it for "a solid realism"; secondly, nativism, as I have tried to show for Plato and Descartes, and as the aporia of EAN have made evident, is methodologically and logically cogent; thirdly, even the most rigorous reading of Kant can't ignore that he allows at least for the "basis" of the law-guided nature of our understanding to be *innate* (whatever this may mean) and frequently refers to the *implanted dispositions* and *seeds* of reason; and, fourthly, the insights of

nativism should not be left to *naturalism* which now surreptitiously tries to take the credit, as if it had always already shared this view, for all those things that rationalists have for centuries been ridiculed for, "decapitated," (G. Ryle) and relegated to the "attic" of philosophy (W. Stegmüller).

Today, the arguably most convincing and at the same time truly foundational examples of dispositionally innate knowledge are, firstly, the innate structures of language (*deep structure*) as set forth by Noam Chomsky, which have the additional merit of going right to the heart of the presumptuous and run-down analytic linguistic philosophy; and, secondly, the innate numbers *one*, *two*, and *three* whose eminent importance was already repeatedly emphasized by Plato (as previously discussed) and whose innate nature was primarily demonstrated and illustrated by the works of Stanislas Dehaene. *Nativism*, triumphant today, has by now discovered so may innate capacities, and has demonstrated their activation at so early stages in the development of infants and babies, that the question today would rather seem to be which capacities and what knowledge are *not* dispositionally innate.

But let's consider the way this is treated in Kant who always kept a low profile in this matter and whose attitude is best expressed by the famous passage from CPR, B 145 / B 146:

"*But for the peculiarity of our understanding, that it is able to bring about the unity of apperception a priori only by means of the categories and only through precisely this kind and number of them, a further ground may be offered just as little as one can be offered for why we have precisely these and no other functions for judgment or for why space and time are the sole forms of our possible intuition*."

But is the great mystery of "*why we have precisely these and no other functions for judgment*" and "*why space and time are the sole forms of our possible intuition*" really that unfathomable, from a modern-day perspective? It really takes a certain determination to ignore the obvious answer. But let's, for once, say we assume that the categories are innate functions of thinking and that space and time (along with the previously cited laws of gestalt) are simply the *innate forms of perceptual cognition*. Let's, for once, experimentally accept this terrible, extreme idea. What sinister consequences would it have for the *Critique of Pure Reason*, for critical idealism, for the transcendental system? In my view: none whatsoever! If we conceived of the form of intuition, i.e. space and time, and the laws of gestalt as innate, then they would simply be the *a priori* existing form of human perception. It would change – nothing. The same is true for the categories: if these are assumed to be the functions which are implanted in us and operate in a law-guided way to configure objects from phenomena by rule-guided thinking, where's the problem? This does not bar man from exercising his free will and choose another respect in which to consider a problem, nor does in any way affect the spontaneity, or creativity, of the

human mind. Therefore, we can conceive of the categories as essential, genetically determined functions of thinking, which Kant brilliantly filtered out but abstained from justifying beyond the reasons given in the Transcendental Deduction. Interestingly, in his meticulous examination of Kant's tables of judgments, Michael Wolff has also pointed to Kant's use of a relatively clear "*physiological imagery*" for the categories as "*functions of thinking*":

"*Kant uses 'function' in the way one speaks of physiological functions, for instance of seeing as a function of the eye.*" Having referred to a passage in CPR, B 98, Wolff goes on to argue: "*My comparison of logical and physiological functions is quite in accordance with the way the understanding is referred to, in the Critique of Pure Reason, as the very agency that has logical functions.*" Here, Wolff refers to an expression used by Kant for the "faculty of thought": "*Kant describes this faculty in terms of physiological imagery as 'a truly articulated structure of members in which each thing is an organ, …' (CPR, BXXXVII-XXXVIII).*"[1143]

I am quoting Michael Wolff's argument here because this "*physiological imagery*" in Kant should not be overlooked[1144] and because Kant, if he were alive today, might well subscribe to this point of view since he would be familiar with the history of evolution. So now, we again come to the decisive question: what would change in the *Critique of Pure Reason* as a whole, in critical idealism, in the transcendental systematic, if we assume that the categories, that is, the "*functions of thinking*" and the *forms of the intuition, i.e. space and time*, as well as the laws of perception, are innate? Nothing – absolutely nothing. The innate *functions of thinking* develop automatically, as it were, when the child has reached a certain age, and always into the same properly human basic structures. The same is true for the self-consciousness of the child, which manifests itself at a certain age and marks the point from which on children refer to themselves no longer by their given name but by "I."[1145] That these are *mental functions*

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[1143] Michael Wolff, Die Vollständigkeit der kantischen Urteilstafel: Mit einem Essay über Freges Begriffsschrift, Frankfurt/M. 1995, p. 20f.

[1144] Wolff also draws attention to a similar description by Klaus Reich. Although the latter discusses the concept of function primarily in the context of mathematics, he describes the "functions of thinking" as follows: "*It is in this same sense that the physiologist speaks of the function of an organ, abstracting from the conditions of carrying out this 'action*.'" Klaus Reich, Die Vollständigkeit der Kantischen Urteilstafel, Hamburg 1986, p. 30.

[1145] Kant described this – often underappreciated – turning point as follows: "*… the child who can already speak fairly fluently nevertheless first begins to talk by means of 'I' fairly late (perhaps a year later), […] and from that day on he never again returns to his former way of speaking.*" He further states: "*Before he merely* felt *himself, now he* thinks *himself.*" Immanuel Kant, Anthropology from a pragmatic point of view, 7: 127/128, in: Immanuel Kant, Anthropology, History, and Education, Cambridge University Press 2007, p. 239. In his "Selberlebensbeschreibung" –

rather than *biological* ones, that is, rely on the *modus operandi* of the mind and not on that of physics does not derogate from the fact that they are dispositionally anchored.

*Transformation ad 3*:
*From the categories and forms of judgment to the grammar of vision, grammar of language, and grammar of thinking*

As previously noted, Kant's table of categories, their number, the way they are deduced as well as the fact that they apparently build on the forms of judgment of classical logic has drawn, and keeps drawing, comprehensive criticism. To the present day, no consensus has been reached even among pro-Kantian philosophers about what might be a definitely satisfying answer. In a meticulous study in terms of a modern, state-of-the-art logic of quantifiers, Michael Wolff, as previously noted, comes to the conclusion that while there indeed is a number of points in Kant's presentation and illustration of the table of judgments and of categories that need to be corrected, or explained, and adapted to the state-of-the-art procedures of modern logic, the internal systematic and functionality of Kant's presentation remains defensible. Incidentally, Wolff, just as Klaus Reich, insists on the importance of Kant's *geometrical-visual* arrangement of the table of judgments in the form of a cross, or a square standing on one vertex, that can be divided into right triangles. This is also pointed out by Reinhard Brandt, but a discussion of the correlation between logic and *visual* arrangements would take us too far afield.[1146] At any rate, strange as it may sound, I think that with respect to their origin and anchoring in thinking, the completeness and the perfect form of the presentation are just as important as the validation of the *functions of thinking* presented in the *Critique of Pure Reason*. For, ultimately, what is at issue here is the critical self-assertion of thinking and the logical laws of think-

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something of an autobiography –, German Romantic writer Jean Paul very vividly described this turning point of becoming conscious of oneself as an "I": "Nie vergeß' ich die noch keinem Menschen erzählte Erscheinung in mir, wo ich bei der Geburt meines Selbstbewußtseins stand, von der ich Ort und Zeit anzugeben weiß. An einem Vormittag stand ich einmal als sehr junges Kind unter der Haustüre und sah nach links nach der Holzlege, als auf einmal das innere Gesicht 'ich bin ein Ich' wie ein Blitzstrahl vom Himmel vor mich fuhr... da hatte mein Ich zum ersten Male sich selber gesehen und auf ewig." Jean Paul, Selberlebensbeschreibung, Werke Bd. III, München o.J.

[1146] Michael Wolff, Die Vollständigkeit der kantischen Urteilstafel: Mit einem Essay über Freges Begriffsschrift, Frankfurt/M. 1995, p. 142; Reinhard Brandt, Die Urteilstafel. Kritik der reinen Vernunft A 67–76; B 92–101. Kant-Forschungen Band 4, Hamburg 1991, p. 60. See also the square of opposites in syllogistic logic, e.g. Ernst Tugendhat, Ursula Wolf, Logisch-semantische Propädeutik, Stuttgart 1993, p. 73.

ing in the form of a priori synthesis, that is, the organized and law-guided configuration of the manifold into representations and concepts. *Synthesis*, as Kant quite rightly saw and explained, is the "primal principle," the core of the configuration, by thinking, of objects and the grasping of their relations and modalities. The question of the basic *a priori* principle of these functions, i.e. what Hermann Cohen called "*the principle of the origin*" or the "*judgment of the origin*,"[1147] is at the very heart of Kant's doctrine and, thus, also of Neo-Kantianism. Kant's guideline in the discovery of these elementary functions of thinking were the forms of judgments as presented in his special, well-argued revision, and this procedure was obviously productive and led on to his development of the *categories* that underlie our object constitution. But in my view, there is yet another way of thinking this origin, namely by starting out from the root, i.e. the *origin in visual thinking*, and proceeding, from there, to the concept.

In the *Regulae*, Descartes had tried to solve the problem of the origin, or anchoring, of the logical by his very own method, namely the grasping – provided it happens all at once, clearly and distinctly – of the "*simple natures*" by the "*natural light.*" Descartes thus offered an anchoring which, if perhaps naturalistic in appearance, is primitive in a positive sense. Kant's solution as proposed in the *Critique of Pure Reason* is today criticized as insufficient on the grounds that modern logics have progressed as compared to the forms of judgment relied on by Kant; but as shown by Michael Wolff, some of this criticism is based on misconceptions. Also, aside from the fact that even today there still is no single, unified logic but a pluralism of different logics – such as, for instance, Brouwer's intuitive logic, or fuzzy logics -, Kant's logic was always meant to be a *transcendental* (!) logic and never a formal one, which is often overlooked. This implies that its focus is not exclusively on the *formal* consistency of judgments, calculations, and propositions in accordance with certain axioms that need to be established; rather, the categories are an essential, if very small, subdomain of logic, namely those concepts of the understanding "*which apply to objects of intuition in general a priori*." Thus, they serve the *constitution of objects* from *the manifold* of the *intuition* in the *synthesis* which is grounded in synthetic a priori judgments, and are not supposed to be a general logic per se. This does not preclude the development of a mathematics-oriented logic, it implies a different agenda and different premises! Also, the forms of judgment are oriented to linguistic-conceptual thinking, and logical thinking, as I have repeatedly tried to show using various examples, is not restricted to conceptual thinking alone but has genetically developed from *visual thinking*.

[1147] Hermann Cohen, Logik der reinen Erkenntnis, Berlin 1902, p. 65ff.

And this is the very starting point for my novel approach, which suggests that we turn to *universal representations*, the *understanding of function*, and *visual thinking* to find the "*anchor*" or "*origin*" of the transcendental basic rules of thinking – which are, after all, supposed to "*apply to objects of intuition*" (!) – since this is where thinking has its roots and from which it developed. But *visual thinking*, in turn, as I have tried to explain, developed from an even older *system of ordering* or *classification* relied on in our discovery of the world, namely the *grammar of vision*. Kant's transcendental logic as well as Descartes' grasping of the "*simple natures*" are similar in essence, and one of the reasons why this is so is precisely that they are not meant to be *formal* logics at all but *transcendental* logics "*which apply to objects*," and are not thinkable in any other way. This is what constitutes their *original affinity*, for while visual thinking has, at its core, obviously outgrown the *grammar of vision* by its ability to manipulate objects in the mind's eye, looking for solutions, it does not attain the level of conceptual abstraction. Kant's approach may well start out from the concept, it is nevertheless inextricably linked to visual thinking through intuition, synthesis, and schema. An idea of how to conceive of this development, of this kinship or "genealogy" of the faculties of visual cognition, will be given in the excursus at the end of this book.

*Transformation ad 4*:
*The concrete scientific representation of the thought processes*

Here, everything we have discussed regarding the gaining of "new insight," or "insight" as such, comes into play, but also *how* an adequate solution to a problem is found in the moment of the aha effect, and *how* scientific and philosophical problems can, by a sudden "turn," lead to a new paradigm. It is a sudden "grasping" of a novel perspective, a novel *respect*, or what Arthur Koestler very concisely described as "*bisociation*" (cf. fn. 652), that is, the process of "seeing" – or, rather, gaining insight into – a certain connection or function in a second, *novel respect* or from a second, *novel point of view*. Marcus Giaquinto aptly expressed this in the phrase, already repeatedly quoted:

"*The creative heart of the discovery process lies in viewing a form in two ways at once*."

This mental seeing of a gestalt in two different *respects* at once led to the conclusion, derived from *gestalt theory* and the processes of vision, that our thinking always seeks to impose a certain *innate order* on the *manifold* of sensory impressions. This process starts with the interpretation of the *manifold* and leads on to gestalt laws-based *figurative synthesis* and to an organization whose formal structure must of necessity be prior to the chaotic, ever-changing influx of *sensory impressions* since, otherwise, *syn-*

*thesis* would not happen at all. Only then can a conceptual, *intellectual synthesis* set in at all, with syntax, or the *deep structure* of *universal grammar*, actually constituting yet another *innate form of organization*. But this is exactly what Kant already said! By imposing our organization, our laws, on the phenomena, we make the *manifold*, or the "*rhapsody of perceptions*," readable for the I, in the first place, organizing it so that the world becomes "livable" and meaningful for us. Kounios and Beeman's scientific studies, based on EEG and MRI technologies, of the aha effect made it quite clear that the sciences unequivocally substantiate the position of *rationalism* in this respect, and that concerns that this might exceed the "critical limit" are quite unfounded. The sudden gaining of *insight*, or intuitive evidence as set forth by Descartes, or our "seeing the light," as Kant put it, is a fundamental process of thinking which is increasingly corroborated by physiology and without which we would never understand anything at all. How the incorporation of these important psychological and cognitive processes into Kant's doctrine should proceed cannot be described in more detail here but is, in my view, not only perfectly compatible with neo-Kantian thinking but even substantiates it, although the respective investigations may go beyond Kant's program. A psychological investigation and presentation is definitely not at odds with Kant's approach but has all the potential of a fruitful enhancement and consolidation.

## Excursus: The relation between visual thinking and Ernst Cassirer's concept of function and symbolic pregnance

Contrasting the rationalistic with the empiricist theory of the *concept*, we have previously explained that *rationalism*'s understanding of the concept, which traces back to Plato, is primarily oriented to the *function* of a thing rather than to its appearance by sensory perception, the *external* characteristics assumed to be *directly* perceivable by naïve realism. In this context, we quoted Arbogast Schmitt's stringent explication:

"*This is the basic meaning of the distinction introduced by Plato and later taken over by Aristotle, namely, that one recognizes a thing not in terms of the sensory data we have of it, but in terms of its 'work' (*ergon*), its activity or function. The latter one does not see, hear or feel but understands*."[1148]

*Empiricism*, as extensively discussed, holds a diametrical opposed view, believing to be able to *immediately* and *directly* copy an object in such a way that all one needs to do to understand a thing is attach a name to it

[1148] Arbogast Schmitt, Modernity and Plato: Two Paradigms of Rationality, Camden House 2012, p. 97.

which goes by the proud title "concept." Locke's "dark cabinet" is, then, supposed to get filled with more and more of these "concepts," just as a cupboard gets filled with shoeboxes. This is how Locke, as previously shown, describes the human mind. In empiricism, the *concept* is, as Ernst Cassirer aptly observed,

"*… in origin as in function merely a totality of memory-residues, which have been left in us by perceptions of real things and processes*."[1149]

Cassirer also reminds us of the objection, already raised by Plato against Protagoras, that sensory perceptions are not one by one "ensconced within us as if we were so many wooden horses of Troy" but must "unite" in one consciousness.[1150] Now, we have learned from Kant that the *concept* is based on the *functions of thinking* and is not a mere name, or label, but embodies a *rule* that serves to determine the *synthesis*, that is, the way the object is to be configured by thinking so that functionally similar, particular objects or individuals can be *subsumed* under this general concept, or rule. The concept as *rule*, as explained by Ottfried Höffe, "*creates unity and determination*."[1151] But beyond its function of providing the rule by which the objects of the intuition (with all their relations and connections) are constituted as such, the *concept* is a constitutive part of every *judgment*, and according to Kant, the faculty of judgment is the understanding and, therefore, *discursive cognition* (CPR, B 170). Thus, the concept does not only consist of the definitory "inner workings" that determine the object in a rule-based way, it also comprises a wide variety of links in terms of all those *relations* and *connections* which, on the "outside," interconnect in a network of logical relationships. This "outside" interconnectedness of the concept was emphasized by Paul Natorp by pointing out that according to Kant, *concepts* are "*predicates of possible judgments*" but at the same time subject to a certain *series* of *points of view*.[1152] Natorp further elaborates:

"*To think is to relate, in the first place. But there is another expression which Kant uses for his 'relation,' namely 'dynamic link,' by which the type of relationship that is meant here becomes fully evident: the relationship of law-based dependence, the functional relationship*." (loc. cit., p. 67)

This concept of "*functional relationship*," in turn, already strongly foreshadows Cassirer's *concept of function*, exposed in 1910 as a counter-

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1149 Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, p. 11.

1150 Ernst Cassirer, Erkenntnistheorie nebst den Grenzfragen der Logik und Denkpsychologie. Jahrbücher der Philosophie 3, 31–92 (1927).

1151 Ottfried Höffe, Kants Kritik der reinen Vernunft, München 2011, p. 120.

1152 Paul Natorp, Die logischen Grundlagen der exakten Wissenschaften, Leipzig/Berlin 1910, p. 43.

concept to the *concept of substance*, which will be discussed in the following. In developing this concept, Cassirer may also have been influenced by the mathematization of logic and by Frege's *concept of function* which was derived from the single-valued relations of mathematical functions. In Cassirer's "*Substance and Function*," the idea of a concept of function is developed on the basis of the *function of series* where the order of the individual terms a, b, c, etc. is determined by the *function* of the series and the *respect* that governs it, that is, by an ordering principle that does *not* directly follow from the terms themselves. Thus, in addition to the determinations of the individual terms, there is a "super-determination" which depends on the *respect*, i.e. the point of view that governs the way the function of series is constituted. This reference to the *respect* that is determinant for any judgment is also consistent, in a way, with Descartes' concept of *respect*. With this, the concept "function" is revealed in its full richness: as the expression of the genuine *function* or *activity* of the object (e.g. a knife) and as a concept which is determined, in each case, by the *relationships* which are *posited*, in a certain *respect*, by thinking. If we try to determine the object on the sole basis of the external properties captured by *sense experience*, we can in the best of cases (with a very simple object) grasp its simplest function (in the case of the knife: cutting) but never "directly" recognize those perspectives and relationships that can be *posited* in a wide variety of respects (bartering object, object of art, lever, bottle opener, etc.).

In contrast, Frege's *concept of function* is derived from the *mathematical concept of function* and is meant to liberate logical thinking "from the rulership of language" and psychologism. But unlike Cassirer's *concept of function* where the concept of series is embedded in an overall, synthetic system of respects, that is, *positings* of the mind, Frege's *concept of function* is fraught with the problem that while due to the *single-valued* assignment method adopted from mathematics it appears to have attained a maximum of logical precision, this very method accounts for its inherent limits because its abstract one-dimensionality fails to capture the concept's true *potential of functional relationships*.[1153] The reasons are, in principle, the same as those discussed with regard to Frege's terminology, i.e. its "bad Platonism" and sterility. Thus, in *Function and Concept*, Frege writes: "*My starting point is what is called a function in mathematics*." He delights in the mechanics of simple equations such as $y = x^2 - 4x$, and illustrates his novel terminology by a simple function: "*We give the name 'the value of a function for an argument' to the result of completing the function with the argument*." Finally, he proposes the following definition of *concept*:

[1153] Cf. Gottlob Frege, On the Scientific Justification of a Concept-script, J.M. Bartlett (trans.), in: Mind, 1964, 73, pp. 155–60.

"*Indeed, we may say at once: a concept is a function whose value is always a truth-value. Again, the value of the function* $(x + 1)^2 = 2(x + 1)$ *is always a truth-value.*"[1154]

Here, Frege's fatal equating of *concepts* and *mathematical terms*, which can be attributed to the combined effect of a misreading of Plato's doctrine and a *naïve realism*, is already indicated. For the bad Platonism of his concept of number now spills over to conceptual thinking, contaminating it with the *abstract*, *single-valued one-dimensionality of mathematics*. But as we have repeatedly argued, true synthetic thinking, problem-solving, and going-beyond result from a capacity of "*viewing a form in two ways at once*" (Marcus Giaquinto). Koestler had described this as "bisociation," and Cassirer had emphasized "*that it in one stroke establishes a thousand connections*." Frege's misguided if alluring approach is the combined effect of his failure to understand the function of *synthesis* in Kant and his equating of things, thoughts, and mathematical terms. For Frege, all there is are finished, self-contained entities, things, thoughts, and signs, all of them uniform "tokens." The result is the plausible idea of using *mathematical functions* as a model for the way things, or their representations, are linked in thought associations, mimicking the way letters and numbers can be linked in equations. This flawed method is perfectly expressed by the following observations:

"*I do not deny that even without a symbol the perception of a thing can catalyse a group of mental pictures, but we could not pursue these further: a new perception would swallow them into darkness and allow new ones to appear. When on the other hand we call forth the symbol of an image of which a perception has reminded us, then in doing this we have created a firm new focus about which images gather.*"[1155]

Thus, Frege starts out from the copies of *finished things* in his "inner film" where mental images keep floating in his head, unable to find a foothold unless a *symbol* provides them with a point where they can crystallize This symbol is, then, supposed to take the place of the thing. He clearly ignores that he is initially quite unable to predicate anything at all about the thing and that BEFORE he can assign a symbol to it, he first needs to form a concept of the thing by *synthesis* and to be able to generate and understand its genuine *functions* and *relations* – not its perceptual images (!). These functional relations, however, can change whenever a novel *point of view* is applied. And this is precisely what defines Kant's epochal achievement: to have deduced and grounded these functions of thinking

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[1154] Gottlob Frege, Function and Concept, in: Gottlob Frege, Collected Papers on Mathematics, Logic, and Philosophy, Brian McGuinness (ed.), Basil Blackwell 1984, pp. 137–156.

[1155] Gottlob Frege, On the Scientific Justification of a Concept-script, J.M. Bartlett (trans.), in: Mind, 1964, 73, p. 105.

which account for the very possibility of the synthetic configuration, in thinking, of the object. Cassirer never ceased to denounce this "*moment of naïve realism*" as the congenital defect of EAN, i.e. operating with seemingly finished things, "*naturally*" composing the object from "*properties*," and conceiving of these "*properties*" themselves as something that is quite simply and unproblematically "*given*," or "*the given*":

"*What is to be understood by 'properties' themselves and how 'properties' can be identified and distinguished from each other at all: this question is not raised in the process*."[1156]

Cassirer, on the contrary, emphasizes that it is not only the selection of properties and their organization into *groups* (and, here, one might add: gestalts) but even the very identification of what is seen as a *property*, in the first place, that depends on the "*prevailing interest of thinking,*" that is, the *point of view* that governs the respective thought or investigation. Thus, we can never start out from a finished set, or "*material*," of *given properties*. Rather, as previously noted, this is precisely the "*moment of naïve realism*" in the theory of logicism "*which, from now on, dominates and determines its entire construction*":

"*The 'origin' of the properties themselves is not at issue: it is not for logic to answer for it but for the world of 'things,' or the given world of 'impressions'*." (loc. cit., p. 162)

So, this is not about sensory impressions that float about with no rule to follow and no point to crystallize as in the flawed EAN theory of perception and its dependence on sense experience, this is about the *synthesis of a manifold*. Therefore, Cassirer emphasizes the activity of the "*productive imagination*" in this context, which is the essential function of concept formation:

"*In the concept, the work of the productive imagination stands before us in an intensified form. Hence we fall into a misunderstanding of its sheer 'whatness' as soon as we attempt to transform it into a sum of reproductions, a mere aggregate of remembered images*."[1157]

This means that due to the free-floating mental images, the "*naïve realism*" of the retinal images, and the *mathematical procedure* of single-valued assignment, Frege essentially misses the crucial point, namely concept formation qua synthesis in the "*productive imagination*."

But Frege, unaware of the "*naïve realism*" that makes him start out from the retinal images, believes to have found a way of overcoming the

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[1156] Ernst Cassirer, Zur Theorie des Begriffs, in: Ernst Cassirer, Erkenntnis, Begriff, Kultur, Hamburg (Meiner) 1993, p. 161f.

[1157] Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 306.

unreliability and lack of precision of language, where the meaning of concepts may change or even be *vague*, by relying on a language of mathematical-logical symbols:

"'*The horse*' *might symbolise an individual and it might symbolise a species as in the sentence 'The horse is a non-carnivorous animal.' ['] Horse ['] can, finally, symbolize a concept as in the sentence 'This is a horse.' Language is not in such a way dominated by logical laws that compliance with grammar would of itself guarantee the correctness of thought processes.*" (loc. cit., p. 156)

But this rigid insistence on precision is precisely what invalidates the very functionality of Frege's argument, not unlike what could be previously shown for the debate about *universal representations*. For actually (as previously discussed with respect to Berkeley, Hume, Russell, and Kant), this *vagueness* (and, thus, multifaceted openness) of the *universal representation* – the fact that it is not the result of a single-valued copying procedure – is precisely what constitutes its strength since it allows it to capture the *essence*, the *significant traits* of a representation (e.g. a horse) without having to define it in every single detail. Thus, in contrast to the abstract mathematical term, the *concept* has the advantage of being able to capture both the infinite richness of the concrete relations and the *unity* and *determination* of the object without reverting to the single-valued, or one-dimensional, copying mode that one expects to find in mathematical terms, pocket calculators, robots, or cyborgs. For the *abstract a* or $x$ or $x^2$ is precisely this sterile, contentless token that had first to be *concretely synthesized* from a manifoldness, just as we first need to productively synthesize the gestalt of a horse to be able to understand it in its *essential traits* and its functionality. The *abstract a* or $x$ or $x^2$ is indifferent as to the formula of which it is a part, or the letters next to which it is placed, it only ever represents its abstract self – $a$ or $x$ or $x^2$. The horse, in contrast, is not indifferent as to whether it is placed in the middle of a fire or a pasture and is functionally, in this as in any other relation, at the same time an herbivore. But $a$ or $x$ or $x^2$ remain $a$ and $x$ and $x^2$ for ever and ever, they do not grow old and, what is more, they don't need feeding. This is what accounts for their charm and their reliability. But a horse, an animal with a lot of *properties*, *features*, and *relations* – and this brings us back to our subject – is not a never-changing, abstract token and can be predicated in a wide variety of respects, e.g. as a Trojan horse or a draft horse. Frege's mathematical *concept of function*, in contrast, remains single-valued, sterile, abstract and, what is more, exceeds the critical limit from the moment of its creation since it posits *things* which appear to be *directly* available in a *finished* state and ready for copying and are supposed to enter his representational world as *copies on the retina*.

Similar objections are raised by Ernst Cassirer against the apparently precise, single-valued assignment function relied on in modern EAN log-

ic, arguing that a relation cannot be analytically broken down into individual "parts" and, then, reassembled from the components thus obtained:

"*The relation a R b is not an aggregate which consists of individual parts; it cannot be thought in the form of (a + R + b) because the term labeled R belongs to an entirely different dimension, its meaning is entirely different from that of the terms a and b.*"[1158]

Again, Cassirer's reasoning is based the foundational Kantian motive of *synthesis*. The relation R which represents the rule-guided linking function of thinking pertains to an "*entirely different dimension*" and is *posited* from the *point of view* that determines the line of thinking. The *properties* which are linked by this relation are subject to this rule but the perspective, or point of view, pertaining as it does to a different "*dimension*," cannot be dealt with at the level of the properties a and b, unlike what holds for the x in an equation such as y = x + 1. Therefore, Cassirer makes the concept of function the basis of his "*philosophy of meaning*," but he is well aware that while the precise and cogent logic of mathematical functions can be an important instrument in the abstract world of mathematics, it can also be a fallacious one. For the real-world *properties* which are integrated into the concept are, as Kant has shown, products of the *synthesis* of a *manifold*, and this *synthesis* is based, as we have comprehensively discussed and demonstrated, on the operations of the *imagination* which are "*hidden in the depths of the human soul*," while the "*thousand connections*" the concept creates "*in one stroke*" make for the superiority of transcending, synthetic thinking as compared to single-valued assignment! Therefore, Cassirer, as previously described in the chapter on empiricism, first of all applies himself to a criticism of the "abstracted" concept (of EAN, as set forth) which is supposed to be generated by our selecting a subset of common properties, "*from any arbitrary collection of objects*," which properties are, then, taken to represent "*the total structures of the members of the collection*":

"*In fact, there is nothing to assure us that the common properties, which we select from any arbitrary collection of objects, include the truly typical features, which characterize and determine the total structures of the members of the collection.*"[1159]

Incidentally, Kant's terminology has morphed into *properties*, *members*, *complexes*, and *structures* in Cassirer. He is, after all, formulating the basic idea of the novel procedure which transcends even that of Kant's concept-guiding rule:

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[1158] Ernst Cassirer, Inhalt und Umfang des Begriffs, – Bemerkungen zu Konrad Marc-Wogaus gleichnamiger Schrift, in: Ernst Cassirer, Erkenntnis, Begriff, Kultur, Hamburg (Meiner) 1993, p. 180.

[1159] Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, p. 6f.

"*Thus it becomes clear that the general formal rule in itself does not suffice; that on the contrary, there is always tacit reference to another intellectual criterion to supplement it*." (loc. cit., p. 7)

This is the central argument that allows us to understand rather than undercut the deep dimension of the concept! The *concept* must not only determine the object in accordance with its *function* and in a rule-based way, Cassirer now openly addresses what in the EAN concept and, thus, in Frege, is always both *tacitly* implied and ignored, namely the object's multiple links, connections, and relations with other objects, concepts, and representations and, first of all – as previously emphasized -, its transcendental genesis without which we would never be able to grasp the function of the object, in the first place. Plato's original insight that we need to grasp the multifaceted *function* of an object and not just copy it on the "photographic plate" (Russell) of the mind, as well as Immanuel Kant's brilliant insight that we first need to construct our objects in the *synthesis* of the *manifold* – it now comes round, in a modern form, in Ernst Cassirer, a science-affine neo-Kantian of the Marburg School:

"*This synthesis … possesses no immediate sensible correlate in the contents compared. According to the manner and direction in which the synthesis takes place, the same sensuous material can be apprehended under very different conceptual forms*." (loc. cit., p. 15)

This insight, modelled on Plato, then leads on to the Kantian insight:

"*We say that a sensuous manifold is conceptually apprehended and ordered, when its members do not stand next to one another without relation but proceed from a definite beginning, according to a fundamental generating relation, in necessary sequence.*" (loc. cit., p. 15).

Finally, Cassirer, combining both arguments, presents his novel definition of the concept:

"*It is the identity of this generating relation, maintained through changes in the particular contents, which constitutes the specific form of the concept.*" (loc. cit., p. 15)

This concept which is defined in a certain *respect* by a "*generating relation*" is, then, fine-tuned for its application in the sciences where "*the concept is freed of all thing-like being*" and "*its peculiar functional character is revealed*" ever more clearly, in particular in physics. This novel concept of function is determined by the "*series F (a, b, c…)*" where the individual terms, or moments, are determined by their *function*, that is, the *relevant respect* in which they are combined in a rule-based way, which can only ever happen in an *act of synthesis* and is thus the opposite of the supposed copying act of EAN as well as Frege's single-valued mathematical assignment function. With this, we have grasped and understood the essence of

Cassirer's concept of function as expounded in 1910. Let's now consider the decisive further steps that lead to the *transcendental concept of function*.

In *Substance and Function*, Cassirer's approach to the concept of function is still clearly based on the concept of mathematical series, but in the years that follow he keeps developing it, taking into account and dynamizing Kant's concept of *synthesis* until the result is a *transcendental concept of function*. This important transformation is reflected in his 1928 essay "*Zur Theorie des Begriffs*":

"*This is what I now believe to see more distinctly and clearly than I did in the reflections in my earlier work: that for such a 'philosophy of meaning,' mathematics and the mathematics-based natural sciences will always be an important and indispensable paradigm but are in no way exhaustive in terms of content. The entire sphere of 'exact' concepts is, as I now explicitly acknowledge, only a particular province in the region of theoretical meaning…*"[1160]

Over time, Cassirer had obviously realized that the single-valued form of abstract mathematical assignments is far from sufficient to adequately and comprehensively describe the full complexity, creativity, and multifacetedness of thinking, primarily with regard to his own philosophy of "*symbolic forms*." This is why he moves on, leaving the mathematical concept of function behind. After all, as pointed out by Rainer R. Bast, one of Cassirer's basic motives is "*the tendency* against *monism, anything static and rigid, naïve metaphysics, substance, and* for *relation, movement, function*."[1161]

Cassirer explains and comments on this overcoming of the mathematically conceived *concept of function* in his – already referred to – 1928 essay "*Zur Theorie des Funktionsbegriffs*," which is a commentary on Georg Heyman's positivism-inspired logic. Here, it should be born in mind that in contrast to his mentor Cohen who based his "*Logik der reinen Erkenntnis*" entirely on the theory of *judgment*, Cassirer's thinking was always centered on the theory of the *concept*:

"*The theory of the concept has become the true cardinal problem of systematic philosophy: the pivotal element around which logic as well as epistemology, philosophy of language as well as the philosophy of thinking revolve*."[1162]

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[1160] Ernst Cassirer, Zur Theorie des Begriffs, in: Ernst Cassirer, Erkenntnis, Begriff, Kultur, Hamburg (Meiner) 1993, p. 156.

[1161] Rainer A. Bast, Einleitung, in: Ernst Cassirer, Erkenntnis, Begriff, Kultur, Hamburg (Meiner) 1993, p. XXXII.

[1162] Ernst Cassirer, Zur Theorie des Begriffs, in: Ernst Cassirer, Aufsätze und kleine Schriften, Gesammelte Werke, Hamburger Ausgabe, 2004, p. 84ff. (first published in: Kant-Studien 33 (1928), p. 129–136).

Here Cassirer, in the best Kantian tradition, tries to strike a balance between the mathematics-based *concept of function* and the emerging philosophy of language and its "*philosophy of meaning*." He begins by formulating his departure from the mathematical concept of function, stating "*that for such a 'philosophy of meaning,' mathematics and the mathematics-based natural sciences will always be an important and indispensable paradigm but are in no way exhaustive in terms of content*."[1163] A "*philosophy of meaning*" that is derived from the logic of mathematics is always inadequate insofar as it only ever "*embraces*" but never "*grasps*." As Cassirer emphasizes – and here, Frege and Russell come to mind – the general is not a mere "*matrice*" for the particular but "*represents the 'unity of the ground'*" (loc. cit.). He thus affirms that he is concerned with a transcendental logic rather than a "mathematical" one:

"*A truly 'general' logic can, therefore, only be based on a 'transcendental' logic, i.e. a logic of the objects of thinking. It is their structure, their nature, their interrelation, and their necessary connection that need to be explored. It is to this end, and no other, that the reflections in my work 'Substance and Function' were essentially geared.*"[1164]

The crucial difference is that the factor which is decisive for the legitimation of the respective conceptual "grasp" principally pertains "*to a direction and level of thinking which are completely different from that of the mere process of abstraction*."[1165] Cassirer then specifies his central idea, which I will try to convey by quoting him more extensively and, thus, do justice to the full content of his arguments. Cassirer starts out from the importance of the *properties* of an object or relation:

"*The givenness of properties is the safe ground, the evident starting point for the theory of the concept. Not to ignore, however, that the way in which thinking proceeds when combining these properties, the way in which it links them into groups, is determined not by the content of the properties alone but by the prevailing 'interest' of thinking.*" (loc. cit., p. 88)

In this, Cassirer's "*prevailing interest of thinking*" corresponds to the *point of view* (the *respect* in Descartes) which is due to a positing act of the mind, (a point already discussed earlier by J. Jenkins in his critique of Locke with regard to the meaning of "*interest*" in this context). Cassirer

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1163 Ernst Cassirer, Zur Theorie des Begriffs, in: Ernst Cassirer, Erkenntnis, Begriff, Kultur, Hamburg (Meiner) 1993, p. 156.

1164 Ernst Cassirer, Zur Theorie des Begriffs, in: Ernst Cassirer, Aufsätze und kleine Schriften, Gesammelte Werke, Hamburger Ausgabe, 2004, p. 85.

1165 Ernst Cassirer, Zur Theorie des Begriffs, in: Ernst Cassirer, Aufsätze und kleine Schriften, Gesammelte Werke, Hamburger Ausgabe, 2004, p. 87. Cf. Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowl-edge, New Haven & London: Yale University Press 1957, p. 281ff.

emphasizes that for a *purely formal* conceptualization, any combination of properties will do provided they meet the "*formal requirements*":

"*Any arbitrary combination, any connection created by a simple 'and-operation,' to speak in terms of general gestalt theory, will yield a meaningful and fully valid conceptual gestalt*." (loc. cit., p. 88)

Now, this reasoning is remarkable in two ways: firstly, Cassirer affirms the argument that a purely *formal* logic of the concept would lead to abstract arbitrariness even if it abided by all the established rules. Secondly, Cassirer here literally includes considerations of "*general gestalt theory*," which shows how strongly he was aware of the inherent affinity between *gestalt theory* and Kant's doctrine, seeking to combine them in his transcendental philosophical system.

He then turns to the important issue of the *properties*, defining it from the start as the basis of his conceptual "*philosophy of meaning*." What are these "*properties*" and *how* do we ascertain them? Are they a finished sensory "*material*" which we just need to pick up, which is simply "*given*" to us?

"*Does the world of immediate sensory experiences actually present real 'properties' which we can simply pick up from it, completely configured, and combine into 'concepts' by mere additive linking? Or isn't it rather the opposite that is true – shouldn't the positing of the property in fact already presuppose the work of the concept which it means to ground?*" (loc. cit., p. 89)

Here the central arguments of *gestalt theory* productively converge with those of Kant and begin to form the basis of a novel, superior theory of the concept. The position of the individual *element*, the individual *tone*, is determined by the melody, and once they begin to move jointly, the most divergent *individual elements* become a *group*. It is not the *properties* ("Merkmale") that determine the thing, it is the *active synthesis* of the object which assigns their role to the *properties*! This provides the leverage point for Cassirer's approach:

"*It is one of the most striking phenomena in the historical development of this logic that it almost always starts out from the givenness of the properties rather than leading up to it. With this, a moment of 'naïve realism,' as it were, becomes a basic element of formal logic, which from now on dominates and determines its entire construction*." (loc. cit., p. 89)

This immediately brings to mind Frege and his example, previously discussed, of the horse which "*is an herbivore*," Russel's table with its various properties, Tugendhat's red castle, and, last but not least, Wittgenstein's pink blotting paper. The *naïve realism* of the "given" is the medium, as it were, by which these logics are brought into play, and the editing-out

effect of the EAN *mechanism of self-deception* keeps the semblance of their functioning alive. Cassirer:

"*The 'origin' of the properties themselves is not at issue: it's not for logic to answer for it but for the given world of 'things,' or the given world of 'impressions'. Both of these provide thinking with a wide flow of ever-new finished properties which it, then, just needs to assimilate, compare, and connect in an adequate way.*" (loc. cit., p. 162)

On this basis, Cassirer now addresses the point I have already discussed in my criticism of John Locke:

"*That logic considered the possession of properties to be self-evident and unproblematic to such an extent that it completely failed to recognize the intellectual work which is contained in and implied by this supposed possession – this seems to have its actual reason in the fact that logic was presented with the results of this work as a finished given in terms of linguistic concepts. A world of 'properties' was supposed to be given inasmuch as these 'properties' were fixated and isolated as such by the act of their linguistic designation*." (loc. cit.)

So, when the entire work of synthesis which the *concept* already contains in its accomplished and crystallized form is edited out, on the one hand, but relied on to determine the properties, on the other, the *naïve-realistically "given"* properties of the object appear to be *directly* and *immediately* disposable. "The cat on the mat" is born! In principle, this insight is similar to what *vision science* learned from *gestalt theory*: it is not the passive copying of the "given" properties, it is the active processing of the field of vision with its infinite possibilities that "creates" the properties of an object, in the first place.

This is the crucial point where Cassirer turns away from a theory of the concept which is found to be wrong and, what is more, circular (!), and begins to look for a "*firm bedrock*" and "*hold*" in a "*more primitive stratum*," or "*Urschicht*" as he formulates it. From now on, the focus of his foundational investigations will be on this "*primal stratum and substrate*" of the concept: "*The theory of logical-scientific concept formation must be preceded by a theory of linguistic concept formation*."[1166] This seems to be the intellectual crossroads where Cassirer definitely took the direction of the *Philosophy of Symbolic Forms*. How to escape the EAN mechanism of self-deception, this conglomerate of *naïve realism*, *the "given*," the assumption of properties we can *simply* and *directly pick up*, the *parasitic use* of the *knowledge already crystallized out in the concept*, how to find a "*firm ground*, the "*primal stratum and substrate*" of a "*philosophy of meaning*"? Due to the special combination of logic and sensitivity which is so characteristic of him, he feels that there must be a hidden organic connection

[1166] Ernst Cassirer, Zur Theorie des Begriffs, in: Ernst Cassirer, Aufsätze und kleine Schriften, Gesammelte Werke, Hamburger Ausgabe, 2004, p. 90.

between the world of – here primarily *visual – perceptions* and the world of *concepts*, a "*primal stratum and substrate*" of the concept which accounts for the congruence between the symbolic forms of expression and the gestalts of what we perceive. Oswald Schwemmer highlights a quotation from Cassirer's posthumous writings in this context, where Cassirer refers to a "*process of symbolic formation*":

"*If we could think ourselves back to a stratum of existence which precedes the transformative process carried out by individual symbolic forms – only then would we really penetrate the mystery of these forms*."[1167]

Which is indeed indicative of the very path we have engaged in by positing the *grammar of vision* and *visual thinking*! Schwemmer also very sensitively traces Cassirer's relation to gestalt theory, on the one hand, and various forms of visual perception, on the other, as evident in his use of terms such as "*configurative impulses*," "*group formation*," and "*looking right through at the identical.*" And he highlights Cassirer's profound interest in visual perception:

"*As an instance of this transformation of forms, Cassirer refers to the 'optical inversion,' the sudden 'reversal' of figures, primarily brought about by a change in the figure-ground relationship. This transformation of forms happens suddenly and as a whole – e.g. by a change in the overall relationship between figure and ground as, for example, in the well-known flip-flop image of either a vase or two profiles facing each other*.[1168]

With this, Cassirer's argumentation is very close to the one we have developed in the chapter on "*vision science*": that there must be a primal form of grasping a gestalt *as a whole* from individual perceptions, and that configurative processes must already be at work in visual perception, as previously described in the context of the *grammar of vision* for optical illusions and "flip-flop" figures.

Björn Kraleman offers a quotation which underscores Cassirer's reliance on the gestalt theory-based concept of "the whole" which is always more than the sum of its parts:

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1167 Oswald Schwemmer, Ernst Cassirer – Ein Philosoph der Moderne, Berlin 1997, p. 46; quoted from: John Michael Krois, Oswald Schwemmer (eds.) Nachgelassene Manuskripte und Texte, Bd 1: Zur Metaphysik der symbolischen Formen, Hamburg 1995.

1168 Oswald Schwemmer, Ernst Cassirer – Ein Philosoph der Moderne, Berlin 1997, p. 106; quotation from: Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 158.

"*All consciousness demands some sort of connection; and every form of connection presupposes a relation of the individual to an inclusive whole, presupposes the insertion of the individual content into some systematic totality*."[1169]

With the concept of "*symbolic pregnance*," Cassirer seeks to account for the fact that "*it is the perception itself which, by virtue of its own immanent organization, takes on a kind of spiritual articulation – which, being ordered in itself, also belongs to a determinate order of meaning*."[1170] Which means that this "*immanent organization*" or "*spiritual articulation*" which already "*belongs to a determinate order of meaning*" is only a hair's breadth away from the *grammar of vision* and the *visual turn*"!

Cassirer now defines "*symbolic pregnance*" as "*the way in which a perception as a sensory experience contains at the same time a certain nonintuitive meaning which it immediately and concretely represents*." (loc. cit.)

My impression is that Cassirer was principally on the right track here but that by positing "*perceptual experience*" ("Wahrnehmungserlebnis") as the basis of *symbolic pregnance*, he created a (perhaps Husserl-inspired) term which was too ambiguous and too psychological in nature to carry the burden of a completely new philosophy of symbolic forms. In his exploration of language in Chapter IV, Volume I of his *Philosophy of Symbolic Forms*, however, Cassirer develops a number of very interesting ideas concerning the intrinsic formation of concepts, their "*primary formation*."[1171] I will briefly outline them because while Cassirer does not give a conclusive answer to the observations he so clearly sets forth, I strongly feel that they could be meaningfully substantiated in terms of the *visual turn*. Cassirer begins by criticizing, in ever-new formulations, the nominalist-empiricist concept of abstraction which identifies things on the basis of certain "given" properties and which has already been comprehensively exposed as a *circular* maneuver of self-deception. Cassirer here quotes from Sigwart's *Logic*:

"*Thus any attempt to form a concept by abstraction is tantamount to looking for the spectacles which are on your nose, with the help of these same spectacles.*" (loc. cit.)

Cassirer then poses the question which is crucial and fundamental for the "*primary formation*" of the concept:

"*What are the conditions of that first primary foundation which is effected in language and which provides the foundation for all the subsequent and more complex syntheses*

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1169 Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, p. 296f.; Björn Kralemann, Die Begriffstheorie Ernst Cassirers, Kiel 2000, p. 12.

1170 Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 3, The Phenomenology of Knowledge, New Haven & London: Yale University Press 1957, p. 202.

1171 Ernst Cassirer, The Philosophy of Symbolic Forms: Volume 1, Language, New Haven & London: Yale University Press 1955, p. 280.

*of logical thought? How does language succeed in escaping from that Heraclitean river of change, in which no content recurs truly identical – how does language place itself, as it were, in opposition to this flux, and abstract determinate forms from it? Here lies the true secret of 'predication' as a problem both of logic and of language.*" (loc. cit.)

This is followed by a very lucid observation whose consequences most philosophers and linguists have, however, failed to duly appreciate:

"*The beginning of thought and speech is not this: we do not simply seize on and name certain distinctions that are somewhere present in feeling or intuition; on the contrary, on our own initiative we draw certain dividing lines, effect certain separations and connections, by virtue of which distinct individual configurations emerge from the uniform flux of consciousness in the usual logic view, the concept is born only when the signification of the word is sharply delineated and unambiguously fixed through intellectual operations, particularly through 'definition' according to genus proximum and differentia specifica*." (loc. cit.)

But this reasoning, commonly accepted as it may be, always remains on the surface, it cannot explain *how* and, primarily, *why* these "*individual configurations*" emerge, it does not "*penetrate to the ultimate source*," the "*beginning of thought and speech*":

"*But to penetrate to the ultimate source of the concept, our thinking must go back to a deeper stratum, must seek those factors of synthesis and analysis, which are at work in the process of word formation itself, and which are decisive for the ordering of all our representations according to specific linguistic classifications*." (loc. cit.)

Again, Cassirer is concerned with finding a way to "*penetrate to the ultimate source of the concept*," to the motives behind these "*separations and connections*" which must not be prematurely seized by circular reasoning, to that "*deeper stratum*" of the concept which must exist, as he has clearly realized even though he is as yet unable to say what it ultimately consists of or how we can penetrate to it. In light of the *visual turn*, we already suspect where this "*beginning of thought and speech*" is to be found, but let's first follow Cassirer's line of reasoning somewhat further. He first insists that concept formation cannot happen by generalization or subsumption (see our considerations about *visual thinking* in the chapter on schematism)

"*… but on the basis of some particular property which is apprehended in a total intuitive context. The work of the spirit does not consist in subordinating the content to another content, but in distinguishing it as a concrete, undifferentiated whole by stressing a specific, characteristic factor in it and focusing attention on this factor.*" (loc. cit., p. 283f.)

The last sentence is crucial here: Cassirer assumes a "*whole*" which is to be concretely configured and which thinking further distinguishes "*by stressing a specific, characteristic factor in it and focusing attention on this factor*" –

with "*focusing attention on this factor*" strongly foreshadowing the *visual turn*. At any rate, it is clearly stated here that for Cassirer, the "*focus of attention*" is at the very beginning of the concept, the discursive "language" of the understanding. Even if he were speaking metaphorically here, which seems rather unlikely if we go by the examples chosen (colors, etc.), this would still be modelled on the visual sphere. Cassirer now finalizes his reasoning:

"*The possibility of 'giving a name' rests on this concentration of the mind's eye: the new imprint of thinking upon the content is the necessary condition for its designation in language … For the word is not a copy of the object as such, but reflects the soul's image of the object.*" (loc. cit., p. 284)

Here Cassirer is already very explicit: it is the "*concentration of the mind's eye*" which constitutes the "*possibility of 'giving a name'*" to a "*new imprint of thinking*," and the word "*reflects the soul's image*" of an object. Here, the decisive point is the image created in the soul – which echoes Plato!

In his philosophical biography of Cassirer, Oswald Schwemmer has specifically focused on Cassirer's reflections on *symbolic pregnance* because, from a systemic point of view, this is the fundamental "hot spot" of his entire oeuvre. And these are the crucial points worked out by Schwemmer:

1. "*In the sensory experience of a perception, a certain non-intuitive meaning is represented*."[1172]

This very adequately captures Cassirer's basic intention. Strictly speaking, this would seem to constitute an offense in terms of "exceeding the critical limit" in the Kantian sense. For from the point of view of conceptual thinking, a "*perceptual experience*" can't have a "*meaning*." Cassirer, it is true, invokes what he calls the "*experience of a perception*," but even the most flexible construal of Kant's doctrine does not allow for an *experience* ("Erlebnis") per se to capture, or represent, a *meaning*. Cassirer is, of course, aware of this, and therefore keeps circumscribing and circumcircling this essential point of his system of symbolic forms, paraphrasing it in ever more elaborate terms to make this transformation from "*sensory experience of a perception*" to *meaning* plausible; still, from the point of view of the Kantian doctrine, it remains impossible. But the reason why this approach suggests itself to Cassirer and at the same time prevents him from finding the solution is that it is conceived from the "top-down" perspective, that is, from language to visual perception, or from *concept* to *intuition*, and that there can be no "bottom-up" perspective unless one

[1172] Oswald Schwemmer, Ernst Cassirer – Ein Philosoph der Moderne, Berlin 1997, p. 119.

starts out genetically, as I propose to do, from the *grammar of vision* where language is as yet not involved at all! Schwemmer's second point is:

2. "*The representation of a certain non-intuitive meaning in the sensory experience of a perception is direct and concrete*." (loc. cit.)

With this, we have the additional complication that a meaning is not just "represented" but that this representation is supposed to be direct and concrete. Cassirer has time and again argued – and so have I in the course of this book – that discursive cognition can only happen by thinking and that a "*direct and concrete*" representation of a "*non-intuitive meaning*" is by this very fact precluded – unless one considers the "*sensory experience of a perception*" not from the perspective of *conceptual-discursive* thinking, i.e. language, but from that of a progressively evolving *visual thinking*. In the latter case, capturing such a "meaning" may come within reach, with the functions of the *gestalt laws* and the *grammar of vision* as the "enablers" of this act of representation. These functions configure the gestalts, with pregnance, from the manifold of the field of vision and summarize or condense them in the *general representations* in such a way that their *general* and *essential* traits are brought out and preserved. Schwemmer's third point is:

3. *The representation of a certain non-intuitive meaning in the sensory experience of a perception is enabled by the immanent structure of the perception*." (loc. cit., p. 120)

Now things come to a head, for the *meaning* of a certain *sensory experience of a perception* is now supposed to be generated by the latter's "*immanent structure*," which is definitely suggestive of the orientation previously indicated. To be sure, in point 4, this *immanent structure* is described as "*a kind of mental articulation.*" But from a Kantian point of view, this is nevertheless questionable, for how is a "*mental articulation*" supposed to emerge from the immanent structure of a "*sensory experience*" when in the consciousness, all that pertains to the mind is exclusively represented in the discursive mode, that is, by *concepts*? Simply put, there is no escaping the problem of how the concept is supposed to *conceptually* lay open its own "primal stratum," and get contaminated by the senses in the process, without being allowed to step out of the sphere of the concept! So, for all its adequacy, Schwemmer's summarizing of Cassirer's presentation still leaves us with a blank when it comes to discursive-conceptual thinking. And, thus, in spite of Cassirer's highly sensitive efforts to substantiate it, *symbolic pregnance* ultimately remains a magical *experience* of sorts, accomplishing something which, at this level of thinking and from the perspective of the concept, it should not be able to accomplish at all!

With this, we have reached the very point where it is time for us to get back to the *visual turn* and start to unearth this "*firm bedrock*," this

"*primal stratum and substrate*," this "*beginning of thought and speech*" referred to by Cassirer, which is supposed to be made accessible by the "*concentration of the mind's eye*" but cannot be found if one starts out from discursive-conceptual thinking. I have already previously explained that our initial visual image is, first, *configured* by the innate patterns of *gestalt laws* and, then, *figuratively synthesized*, in Kantian terms, by the *imagination*. I have furthermore shown – on the basis of the formation and structuring of our representations and in the context of my critique of Berkeley's and Hume' flawed objection, namely that in the mind's eye, we can only ever represent an individual, singular object such as, for instance, an acute-angled triangle – that it is precisely the biologically founded *vagueness* of the representation which enables us to have *general representations*, in the first place. I have also referred to Max Brod and Felix Weltsch who prophetically described this "*blurred*" nature of our mnemonic images in their 1913 book. Finally, Kant's instructive description in the *Critique of Pure Reason* led to the insight that as early as in the workings of the imagination, the general is "summarized" or "condensed" from the images, "*though not determined through any assignable rule*" but nevertheless in some rudimentary way, i.e. as a monogram which constitutes "*more a wavering sketch, as it were, which mediates between various appearances, than a determinate image*:

"*It is entirely otherwise with the creatures of imagination, of which no one can give an explanation or an intelligible concept; they are, as it were, monograms, individual traits, though not determined through any assignable rule, constituting more a wavering sketch, as it were, which mediates between various appearances, than a determinate image, such as what painters and physiognomists say they have in their heads, and is supposed to be an incommunicable silhouette of their products or even of their critical judgments*." (CPR, B 598)

So, at this initial level of insight, there is a non-conceptual way ("*of which no one can give an explanation or an intelligible concept*") of grasping and representing "*certain traits*" of an object, an animal, a face, which, however, must already be the *essential traits* (e.g. in a caricature) since, otherwise, they could not express the *general* in these objects, animals, faces. Just as Cassirer points out that an object is conceptually denominated by "*distinguishing it as a concrete, undifferentiated whole by stressing a specific, characteristic factor in it and focusing attention on this factor*," our *general representation* is generated by the procedure which I have previously tried to illustrate by the image of a stag drawn on the wall of a cave by early humans, or the schematic stag on a traffic sign. And we have explained that this achievement is based on and made possible by a *form of order* which must have developed from the *grammar of vision* and the *laws of gestalt*. Human beings must always already have been able to "condense" or "summarize" *general representations* of objects or animals where these

objects or animals are presented, in a certain respect, by their *essential traits* or elements and stripped of everything that is accidental and irrelevant for one's understanding of the object, or its function. That way, the emergence of the *universal* becomes explicable because this procedure of the *imagination* creates the groundwork for it *already in the sphere of visual cognition* ("*of which no one can give an explanation or an intelligible concept*") where the concept is still far away. But if, in evolutionary terms, we already have conceptual thinking and language, and if thinking is equated with conceptual discourse, then it is of course difficult, if not virtually impossible, to explain how a *structure* of whatever kind, let alone a *non-intuitive meaning*, is supposed to be grasped "*in the sensory experience of a perception*"!

It the light of this *prejudice*, namely the equating of thinking with language, my attempt to a solution may indeed seem unwonted and contrived. But if one approaches it with an open mind, then the more one thinks about it the more one comes to the conclusion that the evolution of thinking, the emergence of the general from *vision*, cannot have been otherwise. After all, it is from this act of grasping something as a general representation that an – albeit limited – *understanding of function* and, finally, *visual thinking* must have developed, that is, the faculty, still preconceptual, to not only understand elementary mechanical functions but, as I have tried to show in the course of this study, to *visually* go through logical thought processes such as those relied on in chess, in the reasoning of the deaf, and in geometry, as well as in the problem-solving process of Plato's *Meno*, in Descartes' *intuitive evidence*, and in Kant's *schematism*. With respect to the *concept of function*, we can now draw a genetical line from the *general representation* to the operations of the *imagination* in *schematism* which are capable of working out, monogram-like, the essential traits of an object by *intuitive evidence*, as Descartes was the first to realize. Thus, we have clarified how the *linguistic concept* has in essence grown out of the *general representation*, the *monograms of the representation*, the *understanding of function*, and *visual thinking*, and that its primal basis has always been the act of defining the *essential traits* of an object, an animal, a face in the imagination in a way that is rule-guided, *general*, and *necessary*, thus giving its "*pregnance*" to the concept. Last but not least, following this line of thought, Cassirer's *concept of function* can be interpreted in a new way:

"*Thus it becomes clear that the general formal rule in itself does not suffice; that on the contrary, there is always tacit reference to another intellectual criterion to supplement it.*"[1173]

[1173] Ernst Cassirer, Substance and Function, New York: Dover Publications, Dover Phoenix Editions (1923) 2003, p. 7.

With this, we have reached the point of the "identity of identity and non-identity" – and let's note in passing that we suddenly understand Neo-Kantianism's interest in neo-Hegelianism in the 1920s (Kroner, Marck, Levy, Cassirer). At any rate, *Neo-Kantianism* provides not only a genetical explanation of the deep structure of the concept but a *dynamic* as well as *concrete* concept of function, which is superior by far to the *bad abstraction* and *bad Platonism* of Frege's concept of function, or the empiricist idea of concepts being formed by "abstraction."

# Conclusion

Since I believe to have provided a detailed discussion of the individual points of my chain of arguments, I'd now like to conclude by once more strategically summarizing, in broad terms, the groundbreaking new perspectives that have been worked out in this study.

To begin with, I introduced and expounded – for the first time, to the best of my knowledge – the argument that due to the relatively late emergence of language by about 50,000 years BP, there must have been certain forms of non-linguistic, *visual thinking* which enabled early humans to engage in purposive thinking and acting. I called these forms the *understanding of function* and *visual thinking* because these purposive activities were not carried out intuitively in the way even animals carry out simple technical activities, but with a clear objective, if not strategy, in mind and without concepts and language as we know them to rely on. This innovative approach opened up an entirely new perspective on the relationship between *vision* and *conceptual thinking*, or *grammar of vision* and *universal grammar*. Based on this new paradigm, my first step was to reconstruct and discuss classical rationalism without its EAN (**E**mpiricism, **A**nalytic philosophy and **N**aturalism) misrepresentations in an effort to make it "presentable" again. To this end, I described both *rationalism* and *empiricism* from a modern, rationalistic perspective so as to adequately work out and correctly present rationalism's basic elements and put an end to the marginalization, distortion, and suppression of *rationalism*, incidentally the very philosophy which provided the basis for European Enlightenment. This was followed by a second step, namely an in-depth analysis and critique of classical empiricism à la Locke and Hume, the focus being on three basic domains, i.e. empiricism's inoperable *theory of ideas*, misguided *rejection of nativism*, and flawed *theory of abstraction*, all three of which subsequently became a hallmark of positivism, naturalism, and analytic philosophy, as well.

This provided the basis for taking into account, in a third step, the new scientific insights of *vision science* which, due to the surprising (for EAN) findings that followed on the implementation of informatics and computer technology, had shown EAN beliefs concerning the theory of perception and vision to be simply *wrong*, and rationalism's as well as Kant's theory of perception to be *in principle* right. Furthermore, *gestalt*

*theory*, once marginalized by EAN, was thematized and given prominence as the new paradigm of vision science and the *artificial intelligence* community. Following this, a synopsis of *gestalt theory*, the *understanding of function*, Descartes' *intuitive evidence*, and the aha effect served to provide the mode of *rational insight*, traditionally negated and criticized by EAN, with a philosophical, psychological, but also scientific underpinning.[1174] Rehabilitated, the laws of gestalt, in turn, sustained the insight that visual understanding is *innate*.

From there, I proceeded to the "*grammar of vision*" proposed by Richard Gregory as a parallel to Noam Chomsky's *universal grammar*, and exposed *visual thinking* as a transitional form between these two "grammars." Furthermore, the nature and functionality of our *mental images* in the mind's eye was deduced from saccadic eye movement, and Stephen Kosslyn's findings were relied on to explore their functionality. It turned out that in contrast to Berkeley's and Hume's skeptical arguments, *general representations* are indeed possible, and this insight was validated by arguments from Bertrand Russell, Descartes and, primarily, Kant, in particular by the latter's considerations concerning "… *the creatures of imagination, of which no one can give an explanation or an intelligible concept; they are, as it were, monograms, individual traits, though not determined through any assignable rule, constituting more a wavering sketch, as it were, which mediates between various appearances, than a determinate image, such as what painters and physiognomists say they have in their heads, and is supposed to be an incommunicable silhouette of their products or even of their critical judgments*." (CPR, B 598)

In a fourth step, based on the philosophies of Plato and Descartes, I worked out the relevance of the *dispositional innateness* of our basic "*functions of thinking*" for the doctrine of *rationalism* and tried to show that these two philosophers were not concerned with finding a mythical or religious validation of their philosophies but, on the contrary, faced the logical necessity, following from their systemic arguments, to provide a grounding for the *a priori* existing structures of the mind in accordance with the knowledge and mindset of their time. After that, based on Peter Carruther's work "*Human Knowledge and Human Nature*," I showed that meanwhile, the pressure of nativist evidence has become so strong that even declared empiricists tend to defect to *nativism*, albeit under the banner of *naturalism*. In the process, Carruthers even goes so far as to casually dispose of "*sense experience*," nothing less than the philosophical-intellectual foundation of EAN. I then invoked state-of-the-art scientific findings that substantiate nativism, and showed that as a consequence, both the foundational EAN dogmas are incorrect and, today, indefensible.

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[1174] See Laurence Bonjour, In Defense of Pure Reason, Cambridge University Press, Cambridge 1998.

Furthermore, I tried to clarify Kant's position on the issue of innate and "implanted natural dispositions," faculties, and powers by a very careful examination of his respective writings, with the result that while he definitely denied the existence of finished, innate concepts and was, thus, in good company with René Descartes, a nativist view can nevertheless be inferred from quite a number of references and quotations concerning *implanted dispositions* and *faculties*. The statements most frequently quoted in this context also clearly refer to an *innate ground* of the *intuition of space and time* and the *categories*. Subtle attempts, e.g. by Riehl, to co-opt Kant for empiricism could be shown to be at least "inaccurate." Nativism has become irrefutable.

In a fifth step, I used empirical examples and applications of *visual thinking* to generate an adequate *hypothesis* for my further investigations. This step also served to discuss concrete examples of visual thinking so as to parry the impression that this was just a harebrained pipedream. Let's also not forget that having acknowledged the failure of all of his philosophical efforts, Wittgenstein of all persons, the "shining light" of analytical philosophy, was increasingly concerned with the question of what "*seeing something as …*" might mean, and even found evidence for a mode of understanding located between seeing and thinking. I adopted this strategy for the chapters on "thinking without language" by trying to gear my argumentation to the point where an insight is gained that cannot stem from simple *seeing*, on the one hand, or from language-based conceptual thinking, on the other, since the latter is either not disposable or impossible. I then proceeded to a detailed discussion of *visual thinking* in geometry, where I emphasized – using arguments by Henri Poincaré and Ernst Cassirer – the importance of Euclidean geometry for human seeing and thinking, criticized the EAN tendency to downplay it, and reflected on the way our perception interacts with Lie Transformation Groups which not only attract growing interest in the modern theory of perception but were already emphasized by Ernst Cassirer in one of his last writings in 1945. Finally, the works of Marcus Giaquinto and Jesse Norman served to highlight contemporary attempts to counteract the marginalization of *visual thinking* in geometry by the EAN mainstream.

In Book Two of this study, key texts by Plato, Descartes, and Kant were analyzed to find out whether *visual thinking* could be ascertained and its presence be demonstrated at crucial points of their argumentation even though they never explicitly reflect on it. I started with Plato's famous *Meno* dialogue which features his *experimentum crucis*, i.e. the illiterate slave boy who, guided by Socrates' questions, gets to solve a non-trivial geometric problem. At the same time, this passage provided an opportunity to extend the discussion to geometric-philosophical considerations. It could be shown that the young test person indeed gained the decisive

insight into the solution of the problem by his own efforts when he subjected the square and the diagonals to a *visual thought operation*, and that this operation was clearly an act of thinking, and a much more complex one than that of simply "*seeing something as…*" Which meant that it could only be *visual thinking*. After that, I analyzed the role of *intuitive evidence* in the act of gaining *insight* into the *simple natures* in Descartes' *Regulae*, and distinguished this *visual thinking* from Descartes' concept of the *imagination*. In Descartes, *visual thinking* is present in the act of *intuitive evidence* where the *simple nature* is at a glance, "*all at once*," *clearly* and *distinctly* grasped in a visible context, in this case, geometric figures. This basic form of insight as described by Descartes could be shown to be gained by non-conceptual means, and since it was not mere *seeing* that led to the insight in the logical-geometric structure, it could only be *visual thinking*.

Starting out from these results, I analyzed key passages of the *Critique of Pure Reason* where Kant is concerned with the function of the *imagination* in view of *synthesis* which, in Kant, is the major agency charged with bringing together *intuition* and *concept*. Based on a preliminary analysis of the strategical position of the *Critique* between *empiricism* and *rationalism*, it could be shown that although Kant's central work was from the start largely based on the flawed empiricist theory of perception, thus ending up in a kind of impasse (*intuition*, *sensation*, the *given*), its rationalistic core was nevertheless retained. Finally, Kant's understanding and positioning of the *imagination* in the A edition as compared to the B edition of the *Critique of Pure Reason* was examined, revealing Kant's alternating attribution of the imagination to either the lower or the upper cognitive faculty and allowing us to zero in on the point where visual thinking is likely to be positioned in Kant's system.

Thus, we were all set for solving the cryptic "mystery" of the supposed "*common root*" of sensibility and understanding by conceiving of the *kinship* between the two "extreme ends" in terms of father and daughter rather than brother and sister. *Visual* and *conceptual* thinking are related because the latter developed from the former. With this, as a byproduct, so to speak, of this research and its focus on the *visual turn*, a plausible clarification was brought to an interesting, eternal "mystery" of philosophy. It was, then, discovered that in Kant, the perspective on the *imagination*, but also on synthesis, depends on the *point of view* which governs the construction of the *Critique of Pure Reason*. If one starts out in empiricist terms, that is, bottom-up from the *given* and *sensation*, then the function of the imagination differs from what it is when it is considered, top-down, from the "headstone," namely transcendental apperception. Consequently, in the B edition, Kant changes his positioning of the imagination and attributes it to the understanding, which leads on to the

introduction of *figurative synthesis* and *intellectual synthesis* in CPR, § 24. The imagination is redefined from reproductive to productive. *Visual thinking* could now be ascertained in terms of the transformation of mental images in the *schematism* since it could be shown that the working-out, the "condensing" of the *general* in an unspecific *general representation* of an object, a face, or an animal, etc. happens already before the concept steps in and can, therefore, be neither mere "seeing" nor conceptual thinking but a preliminary stage of *visual thinking*.

With respect to the theory of the *concept*, it could be shown that *visual thinking* and our faculty to condense the *essence*, i.e. the *essential traits* of an object, a face, an animal, or a human being already in the *general representation* is the "primal ground," or "*primal stratum*," in Cassirer's words, of the concept. Cassirer sought to penetrate to this *primal stratum* by creating the – no doubt gestalt theory-inspired – concept of "*symbolic pregnance*." But since he of course approached the issue in the classical way, that is, starting out from the concept, he could not apprehend *symbolic pregnance* in its true origin, i.e. *visual thinking*, and described it as a *sensory experience*, or *sensory experience of a perception*, probably also in reference to certain observations from the clinical psychopathology of perception. But by conceiving of it as an *experience* ("*Erlebnis*"), Cassirer endowed his *symbolic pregnance* with a somewhat subjective-irrational-aesthetic tendency, with the result that its regularity is no longer clearly understood since an *experience* always comes with a certain share of subjective or circumstantial influences and components. This probably also accounts for certain approaches of the current Cassirer renaissance which may relate to this subjective-irrational-aesthetic tendency. In contrast, my systemic "bottom-up" approach which starts out from the pre-linguistic *grammar of vision* enables us to bring the biological and rule-based aspects of gestalt theory to fruition and, thus, ground a law-based and rationalistic approach where Cassirer gets caught up in the individual *experience* of a perception. My construction would thus seem to show a novel, rationalistic but indeed plausible way of solving the eternal problem of the *concept*.

The final step, then, was to reflect on the readjustments needed in a modern, *rationalistic Neo-Kantianism*. The first task, here, was to determine which structural elements of Kant's thinking are indispensable in the sense that disposing of them would mean to turn away from his doctrine rather than enhance it, and which elements are in need of a revision, or readjustment. To this end, the following domains were addressed: 1. *Kant's theory of perception* – which was found to be in need of enhancement in terms of a modern, *gestalt theory*-based theory of *vision*; 2. *The undetermined, hazy status of the innate* ("*natural acquisition*") – here, Kant's apriorism needs to be scientifically re-grounded in terms of the up-

to-date knowledge of *nativism* and evolutionary theory without, however, compromising or exceeding the critical limit; 3. *The table of categories and the forms of judgment* – these are the elements that have most strongly been criticized by the epigones. In the present study, a way of proceeding, bottom-up, from the *grammar of vision* to the *universal grammar* of language to a transcendental grammar was suggested. And, last but not least, it could be shown that *the concrete, scientific-psychological presentation of thought processes* is definitely not at odds with Kant's transcendental philosophy and should be encouraged rather than neglected or disparaged.

With this, I have come to the end of my study where I hope to have outlined, with the readjustments and enhancements previously described, a modern, science-affine *rationalistic Neo-Kantianism* that is up to the task of bringing philosophical thinking and social discourse back to the foundations and merits of an Enlightenment-oriented philosophy of reason. The decline of Western culture, much-invoked today, is in my view due to EAN, which found its most strident as well as most unfortunate culmination in Paul Feyerabend's "anything goes" and led on to the scepticist relativism which today, in the worlds of the media and the internet, is the dominant if utterly misleading mode of thinking. It is due, on the other hand, to a misguided criticism of reason and the Enlightenment[1175] where reason is held to account for historical disasters which were actually caused by anti-enlightenment forces and the enemies of reason. A consequence, as I see it, of these reason-averse tendencies, fashionable as they currently are, is a growing polarization between two equally wrong alternatives: rampant *irrationalism*, *fundamentalism*, and *relativism*, on the one hand, which spreads to all spheres of society, sparing neither the masses nor the intellectuals nor the political leaders nor the media; and partly naïve, naturalistic scienticism, on the other, which provides those led astray by irrationalism, relativism, and fundamentalism with ever more powerful options and weapons.

What appears to have fallen into oblivion is that the entire rise, from the Renaissance onward, of *Europe* if not the entire Western culture was borne by *Enlightenment* thinking which, in turn, reposed on the trust in a *philosophy of reason*, initiated by pioneering geniuses such as Plato, Descartes, and Kant and further developed and defended, in the 20th century, by Cassirer. These are the wellsprings of the very vision of a just, free, meaningfully ordered, productive, forward-looking and at the same time humanistic world that we see perishing before our very eyes. This is the reason why the *visual turn* seeks to initiate an about-face towards a science-affine, *rationalistic Neo-Kantianism* whose supreme mission it is to safeguard these Western traditions and Enlightenment-oriented basic

[1175] The prime example here is "The Dialectic of Enlightenment" by Theodor W. Adorno and Max Horkheimer.

intentions and to promote, at the same time, the progress of science, and society as a whole. The motto remains:

> "… *to demonstrate and ensure the rationality of culture.*"
> Helmut Holzhey (loc. cit)

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# Die Wende von Empirismus, Analytischer Philosophie und Naturalismus zu einem modernen, rationalistischen Neukantianismus

Dieses Buch möchte eine Revolution der Denkungsart auf den Weg bringen. In kritischer Auseinandersetzung mit den Dogmen des Empirismus und der erschlaffenden und konformistischen Analytischen Sprachphilosophie, versucht es eine Synthese aus den Lehren jener Genies zu generieren, welche das Fundament der *westlichen Kultur* gelegt haben: Platon – Descartes – Kant – und im 20. Jahrhundert, Ernst Cassirer. Das neuentdeckte visuelle Denken, welches offenbar eine Vorstufe der Sprache und des menschlichen Denkens darstellt und in der Philosophie stets immanent präsent war, soll wieder in seine Rechte gesetzt und die selbstverliehene Monopolstellung der Sprachphilosophie in Frage gestellt werden. Zudem soll die Substanzlosigkeit der naturalistischen und realistischen Strömungen aufgezeigt werden, welche uns glauben machen wollen, der menschliche Geist sei bloß Gehirn, bzw. eine Maschine.

Der Aufstieg Europas war aufs engste verbunden mit dem *Rationalismus* und der Philosophie der Vernunft, wie sie im Werk *Immanuel Kants* ihre konkreteste Gestalt erlangte. Der zunehmenden *Zerstörung der aufklärerischen Vernunft*, durch die unselige Komplementarität von postanalytischem „anything goes“ und postmodernem Irrationalismus soll hier ein Entwurf entgegengestellt werden, welcher die besten Traditionen europäischer Vernunft mit den neuesten Erkenntnissen der Wissenschaften verbindet. Die neuartige Fundierung des Begriffs durch die „*visuelle Grammatik*“ ermöglicht es, innovative Ansätze zur Theorie des Begriffs, aufbauend auf Ernst Cassirers „Symbolischer Prägnanz“ vorzustellen und zu einem „Update“ der Lehre Kants zu eröffnen. Ein moderner, *rationalistischer Neukantianismus* soll an die Stelle von Geschichtspflege und Kant-Exegese treten. Er könnte die geistige Grundlage eines vernunftbetonten, wissenschaftszugewandten und humanistischen Zeitalters werden.