



Faculteit Letteren & Wijsbegeerte

Liesbet De Kock

In the Beginning was the Act

A Historical and Systematic Analysis of Hermann von Helmholtz's Psychology of the Object

Proefschrift voorgelegd tot het behalen van de graad van
Doctor in de wijsbegeerte

2014

*Der Denker stellt sich in den grossen Zusammenhang der
Philosophie- und Wissenschaftsgeschichte: den dem
“Philosophieren auf eigene Faust”, bei dem jedes
Individuum nur in einem persönlichen zufälligen Reflex
die Antwort auf die Rätsel des Seins zu finden sucht, soll
ein Ende gemacht werden.
[...]*

*Jeder Gedanke, jedes echte Grundmotiv des
Philosophierens steht mit der Gesamtheit der übrigen in
einer ideellen Gemeinschaft: und diese Gemeinschaft der
Ideen ist es, die auch der geschichtlichen Betrachtung
erst Sinn und Leben verleiht*

- Ernst Cassirer (1912), p. 252.

Promotor Prof. Dr. Gertrudis Van de Vijver
Copromotor Prof. Dr. Steffen Ducheyne

Table of Contents

TABLE OF CONTENTS	V
PREFACE AND ACKNOWLEDGEMENTS	1
CHAPTER 1	4
INTRODUCTION: THE POETRY OF PERCEPTION	4
1.1 Hermann von Helmholtz: General Introduction	4
1.1.1 Selective Biography	4
1.1.2 Helmholtz and the Problem of the Object	7
1.2 The Poetry of Perception: Helmholtz's <i>Faust</i>	11
1.2.1 The Realm of the Mothers: Faust in the <i>Dark Gallery</i>	14
1.2.2 The Symbolic Relation to the World: <i>Chorus Mysticus</i>	20
1.2.3 What was There in the Beginning? The First Study Room Scene	24
1.3 General Aim and Strategy	28
1.3.1 Main Research Question	28
1.3.2 The Problem of the Object: Interpretive Framework	29
1.3.2.1 Helmholtz and Empiricism: The Problem of Psychological Construction	30
1.3.2.2 Helmholtz and Kant: The <i>A priori</i> Structure of Understanding	32
1.3.2.3 Helmholtz and Fichte: The Problem of Differentiation	35
CHAPTER 2	39
HELMHOLTZ'S PHYSIOLOGICAL EPISTEMOLOGY AND THE GENESIS OF THE PSYCHOLOGICAL PROBLEM OF THE OBJECT	39
2.1 Introduction	39
2.2 Hermann von Helmholtz and Johannes Peter Müller	40

2.3	Helmholtz's Physiological Reductionism: Anti-Vitalism	42
2.4	Goethe, Purkinje, Müller and the Primacy of Subjective Perception.	50
2.5	Müller's 'Epistemological Scandal': The Law of Specific Nerve Energies	54
2.6	Helmholtz's Physiological Epistemology	62
2.7	(The Sense and Nonsense of) Physiological Neo-Kantianism	67
2.8	Helmholtz's Anti-Reductionism: The Autonomy of Psychology	71
2.9	Summary and Conclusion	75
 CHAPTER 3		 77
 EMPIRICISM AND THE OBJECT: FROM HUME TO HELMHOLTZ		 77
3.1	Introduction	77
3.1.1	Preliminary Clarifications: Empiricism and the Mind	78
3.1.2	Helmholtz, Empiricism and Pure Psychology	81
3.1.3	Overview of the chapter	84
3.2	Hume's New Scene of Thought	84
3.2.1	Hume's Conception of the Problem of the Object in the <i>Treatise</i>	88
3.2.2	The Associative Genesis of the Belief in Thinghood	89
3.3	Hume's Labyrinth: The Aporetic Corners of the Science of Human Nature	94
3.3.1.1	Hume's Quasi-Observational Strategy	97
3.3.1.2	Hume's Labyrinth: Broader Implications	100
3.4	The Genesis of the Object: Empiricism versus Common-Sense	105
3.5	John Stuart Mill's Return to Hume's Perspective	109
3.5.1	Mill's psychological theory of the belief in the external world	113
3.5.1.1	The Inadequacy of the Introspective Method	113
3.5.1.2	The Metaphysical Audacity of Intuitionism	113
3.5.1.3	The Redundancy of the Intuitionist Hypothesis	114
3.5.2	Back into the Labyrinth: Mill and the Self	117
3.6	Helmholtz's Empiricism	120
3.6.1	The Object and Psychological Construction	120
3.6.2	Overcoming the Labyrinth: Helmholtz's Intellectual Leap	127
3.6.2.1	Helmholtz and the Specificity of the Geisteswissenschaften	127
3.6.2.2	Helmholtz and the German idealist tradition	129
3.7	Summary and Conclusion	131

CHAPTER 4	134
HELMHOLTZ'S INTELLECTUAL LEAP (I): TOWARDS A CRITICAL UNDERSTANDING OF EXPERIENCE	134
4.1 Introduction	134
4.2 Kant on Hume's Labyrinth	135
4.3 Kant's Analysis of Experience: Preliminary Remarks	138
4.4 Kant's Doctrines of Synthesis and Apperception	142
4.4.1 The Necessary Connection: Synthesis	144
4.4.2 The Unity of Experience: Kant's <i>I think</i>	147
4.5 Kant and the <i>I think</i> : Discussion	151
4.5.1 Patricia Kitcher's Construction of 'Kant's Problem'	155
4.5.2 Manfred Frank's Construction of 'Kant's problem'	157
4.5.3 Johann Gottlieb Fichte's Construction of 'Kant's Problem'	159
4.6 Helmholtz's Kant: Towards a Critical Analysis of Experience	161
4.6.1 Perceptual Comprehensibility: Founding the Signaling Function of the Sign-Sensation	164
4.6.2 Helmholtz's Kantianism: Critical Reflections	167
4.6.2.1 The Evolution in Helmholtz's Understanding of the Causal Law	167
4.6.2.2 Helmholtz's Psychological Interpretation of 'Subjective Necessity'	171
4.6.2.3 Helmholtz, Schopenhauer and Intuition	174
4.6.3 Helmholtz's Space	179
4.7 Summary and Conclusion	188
CHAPTER 5	190
HELMHOLTZ'S INTELLECTUAL LEAP (II): IN THE BEGINNING WAS THE ACT	190
5.1 Introduction	190
5.2 Helmholtz and Post-Kantian Idealism: Preliminary Remarks	192
5.3 Fichte's <i>metacritique</i> of Experience	193
5.3.1 Fichte's Ego-Doctrine as a Philosophy of Difference	198
5.3.2 Fichte and the Striving Subject	202
5.3.3 Fichte's <i>Facts of Consciousness</i> : The Phenomenology of Perception	207
5.4 Interludium: From the Pure Ego to the Articulated <i>Leib</i>	210
5.5 Helmholtz <i>and</i> Fichte? Possible Objections	216
5.5.1 Scientific Psychology and Post-Kantian Idealism	217
5.5.2 Helmholtz's Anti-Metaphysical Stance and Fichte's Absolute Ego	219

5.6 Helmholtz's Fichte: In the Beginning was the Act	219
5.6.1 Helmholtz's Philosophy of Agency	223
5.6.1.1 Agency and Deterministic Causality	224
5.6.1.2 The Will's Impulse as a Mental Act	226
5.6.1.3 Acting and Moving: The Primacy of the Act	226
5.6.2 Helmholtz's Physiology of Agency	230
5.6.3 After Helmholtz: The Two Williams Debate	233
5.7 Summary and Conclusion	235
SUMMARY AND GENERAL CONCLUSION	238
BIBLIOGRAPHY	249

Preface and Acknowledgements

To perceive and represent objects seems to be as ordinary as eating, sleeping or breathing. Yet, one only needs to take note of the vast amount of literature that has been produced on the subject to realize that the ordinary does not always coincide with the self-evident. The ground and genesis of objective experience is, and always has been, at the center of philosophical attention, and gives rise to fierce debate up to this day. Perception indeed seems to be a kind of ‘everyday wonder’, as Liebmann once noted, and the multi-dimensional nature of the phenomenon only adds to its complexity.¹

Addressing the problem of object experience inevitably involves a consideration of metaphysical, epistemological, psychological and physiological issues. This was, at least, Hermann von Helmholtz’s stance on the matter. Although trained as a physician and physiologist, Helmholtz seemed to be very well aware that one does not simply produce a science of perception without also producing philosophy, and conversely, that reflections on the nature of the epistemological subject-object relation, the metaphysical status of the object, and the nature of the mind, play a crucial role in the creation of scientific paradigms of perception.

Helmholtz’s adherence to empiricism and transcendentalism in attempting to account for object experience has fascinated philosophers ever since the publication of his work. Classical apples of discord in this regard pertain to the extent of Helmholtz’s allegiance to the transcendental tradition, his (alleged) naturalization of the Kantian categories, and the theoretical soundness of his empirico-transcendentalism. Most of these investigations, however, tend to focus primarily on Helmholtz’s epistemology and his philosophy of science, and much less on the way in which his idiosyncratic philosophical perspective was determined by his psychological concerns. As the

¹ Liebmann (1869), p. V.

problem of the psychogenesis of object representation in experience has always been at the core of Helmholtz's research interests, an exploration of this perspective is certainly worthwhile.

Therefore, this dissertation takes the problem of the object, and more particularly the problem of object experience and objectification as a point of departure. The main aim of this analysis is to grasp the systematic purport of Helmholtz's empirico-transcendentalism in addressing the 'everyday wonder' of the constitution of reality. To that end, Helmholtz's theorizing will be interpreted against the background of modern philosophical accounts of experience, and their mutual relation. The choice for this perspective was motivated first and foremost by a concern with the internal consistency and dynamics of Helmholtz's psychological theory. Notwithstanding the great number of excellent studies and interpretations of Helmholtz's work, the question concerning the systematic connection between all the different philosophical perspectives entangled in his psychology remains open. It is common knowledge that Helmholtz was a self-professed empiricist, who also relied on Kant and Fichte's work in articulating his psychological theory of objectification. But what is the glue that holds all these different perspectives together, and what could be the motive for holding such a complex philosophical position in addressing the psychological problem of perception and objectification specifically?

I sought to answer these questions by means of a historical investigation into subsequent accounts of objectification in modern philosophy. I soon realized that the historical progression from (Hume's) empiricism, over (Kantian) *critique*, to (Fichte's) *metacritique* – as it is internally regulated by an increasing concern for the structure and organization of the representing subject – provides an excellent framework for the interpretation of the systematic nature and purport of the different levels of analysis in Helmholtz's theorizing. The synchronic study of Helmholtz's psychology of the object as presented in this work, is therefore informed by a diachronic, historical investigation into the development and transformation of philosophical modes of interrogating and addressing the structure and foundation of object experience and representation. Thanks to this particular angle, new light can be shed on Helmholtz's 'wavering' between empiricism and transcendentalism, and on some interpretative issues that have become commonplace in Helmholtz scholarship.

As will become clear in the following chapters, this analysis unfolds mainly from a study of Helmholtz's (popular) scientific lectures, his work on visual perception, his articles on the epistemology and psychology of perception in general, and on spatial perception in particular. As the bulk of Helmholtz's work focuses on the paradigm of *visual* perception, I chose to rely mainly on his work in that area. It is important to note, however, that this emphasis on the visual faculty does not imply that Helmholtz

reduced perception to vision, or that I do so. Helmholtz's work on acoustics – briefly discussed in chapter 2 – for example, likewise provides an interesting illustration of his general views in this respect. Given the extent of his investigations into the nature of vision, however, and for the sake of clarity and simplicity, I have chosen to restrict myself to that paradigm in illustrating Helmholtz's general outlook.²

In quotations, I have used 'standard' English translations of Helmholtz's work as much as possible (e.g. Cahan's translation of Helmholtz's popular lectures in *Science and Culture* and Southall's 1925 translation of the 1856/66 *Handbuch der Physiologischen Optik*). I studied these English texts together with the original German versions, and where I preferred another choice of words (or another translation altogether) this is mentioned in a footnote. The same holds for references to Kant's and Fichte's work.

Parts of chapters 2, 4 and 5 are drawn from my forthcoming articles "Hermann von Helmholtz's Empirico-Transcendentalism Reconsidered: Construction and Constitution in Helmholtz's Psychology of the Object" (*Science in Context*) and "Voluntarism in Early Psychology. The Case of Hermann von Helmholtz" (*History of Psychology*). I am grateful to the editors of both journals, for providing critical feedback and helpful suggestions. Furthermore, my gratitude goes to all who have supported, inspired and motivated me in the past few years. I owe special thanks to my supervisor Prof. Dr. Gertrudis Van de Vijver for introducing Hermann von Helmholtz's work to me, and for her trust and support. I am also very grateful to my co-supervisor, Prof. Dr. Steffen Ducheyne, for guiding me through the writing process, and providing helpful feedback and suggestions. Special thanks to Liesbet Quaeghebeur and Tim Wijnant for carefully revising and correcting the manuscript of this dissertation, and to Thorsten Ries for transcribing two of Helmholtz's unpublished letters. Lastly, I want to thank mama, Henri, Charlotte, Frederik, and Ellen, for their loving support and patience, and Joris, for everything.

² An especially interesting account of the philosophical dimension of Helmholtz's acoustics can be found for example in Benjamin Steege's (2012) *Helmholtz and the Modern Listener*.

Chapter 1

Introduction: The Poetry of Perception

What I construct historically is not the result of criticism or speculation but of imagination seeking to fill the gaps in observation. To me history is still in a large measure poetry, it is a series of the most beautiful and picturesque compositions.

- Jacob Burckhardt (1943), p. 167.

1.1 Hermann von Helmholtz: General Introduction

1.1.1 Selective Biography

The broad range of Hermann von Helmholtz's (1821-1894) scientific interests and his numerous contributions to the development of nineteenth century science, have never ceased to amaze scholars in the exact sciences, as well as philosophers. After obtaining his medical degree at the Friedrich-Wilhelms Institute in Berlin in 1842, Helmholtz quickly became one of the leading figures in the German intellectual and scientific landscape, thanks to his epochal work *On the Conservation of Force* [Ueber die Erhaltung der Kraft] (1847 [1842]), the *Treatise on Physiological Optics* [Handbuch der Physiologischen Optik] (1856/1866), and his invention of numerous measurements instruments such as the myograph (to study the speed of nerve impulse), the ophthalmoscope (to study the inside of a living eye), and the ophthalmometer (to

measure the curvature of the cornea).³ The physicist, physiologist, and proto-psychologist is not only widely recognized as “a leading figure in shaping philosophy of science during the second half of the nineteenth century”, he is even credited for being “one of the last great figures of the Aufklärung.”⁴

In the first ten years of his life, however, nothing indicated that such a bright academic future awaited the young Helmholtz. Due to his poor health, he could not go to school until he was seven years old.⁵ When his health finally allowed him to attend the Normal School of Potsdam, he initially struggled with languages, and found he had “a bad memory for disconnected things.”⁶ His physical well-being and learning abilities quickly improved, however, and a decade later, Helmholtz graduated successfully from the Potsdam Gymnasium.

During Helmholtz’s childhood, his father Ferdinand – teacher of German and philosophy at the Potsdam Gymnasium – went to great lengths to educate his eldest son in poetry and philosophy. Ferdinand Helmholtz entertained a lifelong intimate friendship with Immanuel Hermann Fichte (the son of Johann Gottlieb), who was also Hermann von Helmholtz’s godfather and namesake.⁷ Ferdinand was very well-read and had a passion for German Idealist philosophy and classical and romantic poetry. It is in the “[m]etre and rhyme of poetry,” Hermann would later recall, that he first found a helpful mnemotechnical method that allowed him to overcome his difficulties with memorizing disparate facts.⁸ In a lecture from 1891, the then seventy year old Hermann

³ For some interesting overviews of Helmholtz’s experimental practice and invention of measurement instruments, see Olesko & Holmes (1993); Finger & Wade (2001, 2002b); Darrigol (2003). In the past decades a number of monographs on Hermann von Helmholtz have been published, illustrating the lasting impression he made on philosophers and scientists. Most notably see Hatfield (1990), Cahan (1993a), Krüger (1994), Turner (1994), Schiemann (2009), and Meulders (2010).

⁴ Heidelberger (1993), p. 461; Cahan (1993a), p. 559.

⁵ Helmholtz (1995 [1891]); Koenigsberger (1902/03). In what follows, both the original 1902/03 German edition of Koenigsberger’s Helmholtz biography, and the (shortened) 1906 F.A. Welby translation are used. Quotes are mostly drawn from the English edition, except when the relevant passage was not included in the English translation.

⁶ Helmholtz (1995 [1891]), p. 383.

⁷ Helmholtz (1995 [1891]); Koenigsberger (1902/03). See chapter 5.

⁸ Helmholtz (1995 [1891]), p. 383. Also see Helmholtz (1995 [1892]), p. 399-400: “Rhythm and rhyme give [...] a type of external order [...]. I consider the prominent influence of the beautiful on the memory of man as an outward sign of what I have here called easily understandable or comprehensible. Poetry is remembered much more easily than prose. [...] [I] believe that an essential part of the effect of the beautiful rests in this, its effect on the memory.”

von Helmholtz furthermore testifies of the way in which his father awakened his interest for philosophy and epistemology:⁹

[T]he interest for questions of the theory of cognition, had been implanted in me in my youth, when I had often heard my father, who had retained a strong impression from Fichte's idealism, dispute with his colleagues who believed in Kant or Hegel.

Although the mature Hermann von Helmholtz's philosophical views diverged significantly from his father's, the intellectual heritage of Ferdinand Helmholtz would remain tangible throughout his later work.¹⁰

Hermann von Helmholtz initially wanted to study physics, but his parents could not afford to inscribe him at the University of Berlin. Therefore he embarked upon a study in medicine at the Friedrich-Wilhelm Institute in Berlin, which was much less expensive, but required him to serve a few years as an army surgeon after graduating. Upon his arrival in Berlin in 1838, Helmholtz soon discovered that the great idealist metaphysical systems with which he was acquainted through his father, were in decline. Already in these early years in Berlin, Helmholtz developed the anti-metaphysical attitude that he would retain until his death (see chapter 2). However, he likewise maintained that his aversion of metaphysical speculation was "not intended against philosophy."¹¹

As a medical student, Helmholtz was especially impressed by his professor in physiology, Johannes Peter Müller, who impassioned him with the study of the anatomy and physiology of the nervous system. The young scientist was soon taken up in the remarkable circle of students Müller had gathered around him, which included Emil du Bois-Reymond – who became one of Helmholtz's closest friends – Ernst Brücke and Karl Ludwig, among others. In 1842, Helmholtz obtained his doctoral degree in Berlin with his dissertation on the structure of the nervous system in invertebrates [*De Fabrica Systematis nervosi Evertibratorum*], supervised by Müller.¹² In the decade after obtaining his degree, Helmholtz performed groundbreaking experiments on fermentation and putrefaction, heat production, muscular contraction and nerve conduction, and published his seminal paper *On the Conservation of Force* (1889 [1847]). Thanks to these accomplishments, Helmholtz became a renowned member of the Berlin Physical Society

⁹ Helmholtz (1995 [1891]), p. 390.

¹⁰ See chapters 4 and 5.

¹¹ Helmholtz (1995 [1877a]), p. 325.

¹² Koenigsberger (1902/03).

[Berliner Physikalische Gesellschaft] (BPS) and was appointed a professor in Berlin (1848-1849), and later in Königsberg (1849-1855), where he embarked upon an area of research that he would not abandon until his death in 1894, i.e. the study of the psychophysiological nature of human perception.¹³

1.1.2 Helmholtz and the Problem of the Object

After his experimental studies on muscle action and nerve conduction in the 1840s and early 1850s, Helmholtz turned to the investigation of the physical structure and physiological functioning of the sensory apparatus. In accordance with this evolution in his research interest, his scientific practice was no longer solely dominated by ‘wet lab’ science, but shifted towards the observational study of the nature and functioning of the sensory apparatus and the perceptual process.¹⁴ In the course of these studies, Helmholtz became increasingly aware of what we might call the *natural defectiveness* of the anatomical and physiological structure of the perceptual system, and the inadequacy of a purely physico-physiological explanation of perceptual experience.¹⁵ With the aid of his ophthalmoscope, for example, Helmholtz could study the inside of a living eye and carefully examine the blind spot as well as the numerous blood vessels that caused gaps or distortions in the visual field. In the same vein, the ophthalmometer allowed him to measure the precise curvature of the cornea, and demonstrate, among others, that it “is not a perfectly symmetrical curve, but [...] bent in various directions,” causing refractive error and a degree of astigmatism, even in healthy individuals.¹⁶ Furthermore, Helmholtz described dark spots within the eye, irregularities in the structure and surface of the lens, and finally concluded that “the eye has every possible defect that can be found in an optical instrument”:¹⁷

Now it is not too much to say that if an optician wanted to sell me an instrument which had all these defects, I should think myself quite justified in blaming his

¹³ Helmholtz (1995 [1891]); Koenigsberger (1902/03). After his professorship in Königsberg, Helmholtz took up a position as a professor in physiology in Heidelberg (1858-1871), later taught physics in Berlin (1871-1888), and finally became president of the physical-technical Reichsanstalt in Charlottenburg (1888-1894) (Koenigsberger 1902/03). Throughout this career, Helmholtz’s main areas of study were visual perception and acoustics. An in-depth discussion of Helmholtz’s relation to Müller (and his students), his membership of the BPS, and the significance and purport of his 1847 paper is presented in chapter 2.

¹⁴ Finger & Wade (2002b), p. 234.

¹⁵ See Chapter 2.

¹⁶ Helmholtz (1995 [1868]), p. 140.

¹⁷ Helmholtz (1995 [1868]), p. 141, 147.

carelessness in the strongest terms, and giving him back his instrument. Of course, I shall not do this with my eyes [...] [H]owever bad they may be, I can get no others.

In addition to these anatomical flaws, Müller's insights regarding the inherently arbitrary relation between external stimulation and internal states of nervous excitation (as discussed in chapter 2) prompted Helmholtz to (i) reject naïve realism or objectivism (see section 1.2.1 and chapter 2), and (ii) deny that the experience of an object is fully reducible to physico-physiological processes (see chapter 2). Instead, what we have called the 'natural defectiveness' of the perceptual system convinced Helmholtz that there is an explanatory gap between the physico-physiological structure of the sensory apparatus and mental representation, and that hence, the perceptual process necessarily involves irreducible psychological processes of interpretation.¹⁸

No doubt the first concern of physiology is only with material changes in material organs, and that of the special physiology of the sense is with the nerves and their sensations, so far as these are excitations of the nerves. But [...] science cannot avoid also considering the apprehension of external objects. [...] [A]pprehension of external objects must always be an act of our power of realization [Vorstellungsvermögen], [...] [I]t is a mental function [Psychische Thätigkeit]. [...] These concealed functions have been little discussed, because we are so accustomed to regard the apprehension of any external object as a complete and direct whole, which does not admit of analysis.

In the winter of 1866, after ten years of strenuous dedication, Hermann von Helmholtz finalized the third and last volume of his magnum opus, the *Treatise on Physiological Optics* [Handbuch der Physiologischen Optik], one of the most extensive studies on human perception ever written. The work, praised for its systematic and exhaustive nature, was first published in its entirety in 1867, revised in 1896, and considered by many as a foundational work of reference for the science of vision at that time.¹⁹ The *Treatise* was the culmination point of Helmholtz's preoccupation with *what it*

¹⁸Ibid., p. 127. As discussed in chapter 2, Helmholtz's psychological non-reductionism distinguished him from his contemporary Ewald Hering, who emphasized the physiological nature of the perceptual process.

¹⁹The first volume of the *Treatise* (*The Dioptrics of the Eye* [die Dioptrik des Auges]) appeared in 1856, the second (*The Sensations of Vision* [die Lehre von den Gesichtsempfindungen]) in 1860, and the third in 1866 (*The Perceptions of Vision* [die Lehre von den Gesichtswahrnehmungen]). In what follows, the 1867 and 1896 German editions, and the 1925 Southall translation are used. The volume referred to will be indicated with Roman numerals.

is to see at least from the early 1850s onwards.²⁰ In the preface, the author specified that his *Handbuch* aimed in the first place at bringing order and coherence in the wide, disparate field of the study of perception. Hence, the subsequent volumes of the *Treatise* respectively go into the causal mechanisms regulating the physical, physiological and psychological aspects of sense perception. This search for causal lawlikeness, Helmholtz declared, was motivated by the desire to attain an “intellectual grasp of the connection of ideas.”²¹ In reading the work, one is soon convinced that the mature Helmholtz had succeeded in transforming one of his self-professed shortcomings, i.e., his inability to deal with ‘disconnected things’ (see section 1.1.1), into one of his greatest strengths as a scientist:²²

This impulse to dominate the actual world by acquiring an understanding of it, or what, I think, is only another expression for the same thing, to discover causal connection of phenomena, had guided me through my whole life and [...] is possibly the reason why I found no satisfaction in apparent solutions of problems so long as I felt there were still obscure points in them.

With regard to the study of perception, one particular obscurity occupied Helmholtz especially, namely the apparent gap or discontinuity between the physical and physiological structure and functioning of the sensory apparatus, and objective representation. One could even say that it is from within this gap, that Helmholtz’s proto-psychology of perception as presented in the final volume of the *Treatise*, arose. This third part of his physiological optics was entirely devoted to this psychological dimension of perceptual experience, or outlines what we may call a *psychology of the object*.

Interestingly enough, finishing up the third, psychological part of his opus magnum seemed to be a real ordeal for Helmholtz, at least if we go by his private correspondence with his close friend Emil du Bois-Reymond during the 1860s. From these it is clear that Helmholtz was really puzzled by the philosophical questions he was confronted with in attempting to articulate his psychological theory. More particularly, Helmholtz found himself to be faced with issues that could not be answered on a strictly factual basis, and required him to “persuade people” with “the most superior arguments.”²³

²⁰ Helmholtz first expounded the physical, physiological and epistemological dimensions of his perception theory in his 1852 inaugural lecture *On the Nature of Human Sense-Perceptions* [Ueber die Natur der menschlichen Sinnesempfindungen].

²¹ Helmholtz (1995 [1869]), p. 207.

²² Helmholtz (1995 [1891]), p. 384.

²³ Helmholtz, as quoted in Turner (1994), p. 74.

One of the distinctive features of Helmholtz's philosophical justification for, and psychological account of, his psychology of the object, that has been fiercely discussed ever since the nineteenth century, is his so called 'dovetailing' between empiricism and (transcendental) idealism or his attempt to reconcile both.²⁴ While Helmholtz defended methodological empiricism, claiming amongst others that "[n]o other method is possible than that of endeavoring to arrive at the laws of facts by observations; and we can only learn them by induction", his insistence on the pivotal role of *a priori* elements in the perceptual process afforded him credit as one of the earliest representatives of the neo-Kantian movement in Germany.²⁵ To complicate things further, Helmholtz regularly referred to Fichte's philosophy in his writings, notwithstanding his fundamental anti-metaphysical attitude.²⁶ This peculiar state of affairs has inevitably lead to very different readings of his work. While some emphasize its empirical dimension, others interpret it mainly against the background of German (transcendental) idealism, while still others have a more mixed reading and rather subscribe to the 'dovetailing' or 'attempt to compromise' – hypothesis.²⁷

This dissertation aims at exploring Helmholtz's empirico-transcendentalism from a very specific angle. That is to say, the main research question of this investigation pertains to the systematic purport of combining these levels of analysis – associated respectively with empiricism, Kant and Fichte – in dealing with the psychological problem of objectification. To that end, Helmholtz's theorizing will be considered against the background of the intellectual history of the problem of the object in modern philosophy, starting with Hume's associationism. Notwithstanding the large amount of Helmholtz interpretations that have been published in the past decades, this systematic point of view remains somewhat underappreciated.

Before outlining the central research questions, structure and strategy of this analysis in detail, we will first present a preliminary overview of the philosophical and psychological assumptions that dominated Helmholtz's psychology of the object.

²⁴ Hamner (2003); Westheimer (2008). This peculiar characteristic of Helmholtz's theorizing has been discussed extensively by Hatfield (1990), among others. Other analyses worth mentioning include Turner (1977), Lenoir (1993, 2006), Cahan (1993a), and DiSalle (2006).

²⁵ Helmholtz (1995 [1877a]), p. 322. For Helmholtz's role in the early movement of physiological neo-Kantianism, see for example, Schmitz (1996), Ferrari (1997), Friedman (2001, 2006), Makkreel & Luft (2010). Also see chapter 4.

²⁶ See chapter 5.

²⁷ In this respect, a comparison between Schiemann's (2009) mainly empiricist interpretation of Helmholtz's philosophy of science with Heidelberger's (1993, 1994) emphasis on the idealist tenets in Helmholtz's philosophical perspective is especially instructive (see chapter 5). In 1850, Boring (1950, p. 304), even went as far as claiming that Helmholtz was univocally opposed the "German philosophy of Kant and Fichte." A more mixed reading is presented in Hatfield (1990), and Friedman (2009), for example.

Helmholtz's work provides us with a fascinating narrative framework to guide this preliminary exploration, namely poetry, and more particularly, Johann Wolfgang Goethe's version of the tragedy of *Faust*.

1.2 The Poetry of Perception: Helmholtz's *Faust*

"I was first of all a great admirer and lover of poetry," Helmholtz writes in his 1891 *Autobiographical Sketch*.²⁸ Not surprisingly, he was encouraged in this love by his father, who was more than willing to pass on his own passion for German literature to his son. During the last twenty years of his life, Helmholtz's poetical inclinations started to transpire in his scientific writings. Especially in his 1892 lecture on *Goethe's Presentiments of Coming Scientific Ideas* [Goethe's Vorahnungen kommender naturwissenschaftlicher Ideen], and (to a lesser degree) in his 1878 *The Facts in Perception* [Die Thatsachen in der Wahrnehmung], Helmholtz enlivens the theoretical exposition of his theory of perception by means of Goethe's magnum opus, *The Tragedy of Faust (I & II)*.²⁹

Goethe's *Faust* has been interpreted by many as an allegorical representation of the major religious, political and philosophical struggles of the modern era, or, in short, as one of the *foundational myths of modernity*.³⁰ As early as 1836, Karl Gutzkow interpreted Goethe's version of the play as "a boundary-stone [...] where the past ends and modernity begins."³¹ Later, Nicholas Boyle likewise described it as "the tragedy of self-conscious modernity," and more recently, *Faust* has been referred to as 'The Theatre of Modernity'.³² The vast amount of literature on the way in which the masterpiece epitomizes the spirit of an era demonstrates the inexhaustible variety of perspectives from which the tragedy can be related to the various events, political, economic, religious and philosophical, associated with the rise of modernity.

²⁸ Helmholtz (1995 [1891]), p. 383.

²⁹ Goethe worked on his masterpiece during his entire life, with *Faust I* appearing in 1808, and part II in 1832. In what follows, English translations are derived either from Bayard Taylor (1871), or Constantine (2005), as indicated. The German text is derived from the 1977 [1808/1832] *Deutscher Taschenbuch Verlag* edition.

³⁰ Redner (1982), p. 42.

³¹ Gutzkow (1836) as quoted in Brown (2002), p. 84.

³² Boyle (1987), p. 36; Schulte et al. (2011).

Johann Wolfgang Goethe's literary work captivated Helmholtz during his entire career.³³ Although Helmholtz firmly rejected the latter's 1810 *Theory of Colors* [Farbenlehre], he never ceased to appreciate Goethe as a poet.³⁴ What is especially interesting about Helmholtz's 1892 lecture, is that he describes the poet and the scientist as allies in the quest for knowledge and truth, writing for example that "insight can be gained into the complicated mechanism of nature and of the human mind in yet another way than that of science [...]. Such a way is given in artistic representation."³⁵ A bit further he reiterates that "art, like science can represent and transmit truth."³⁶

³³ From the letters to his father (written in 1830s), we know that Helmholtz enjoyed reading Goethe's literary work when studying in Berlin (Cahan, 1993b). Furthermore, Helmholtz dedicated two lectures to the romantic poet (the first in 1853, the second in 1892), and he quotes from Goethe's work in his 1878, 1891 and 1892 lectures.

³⁴ Helmholtz (1995 [1892]), p. 400-401. Helmholtz gave a lecture on Goethe as early as 1853, in which he focused much more on Goethe's (flawed) anti-Newtonian theory of colours, and implied that the German poet's scientific work was blinded by his romantic aspirations (see chapter 2). In an appendix added in 1875, Helmholtz reiterates that Goethe's theory of colours remains an "inextricable jungle [unentwirrbares Gestrüpp]" (Helmholtz, 1896 [1875], p. 47 [my translation]). To be sure, Helmholtz did appreciate Goethe's work in descriptive natural science (anatomy and botany), but added that, unfortunately, they "are in sharp contrast with his work in the area of physical natural sciences" (Helmholtz, 1896 [1853], p. 30 [my translation]). In comparison to his 1853 lecture, the tone of Helmholtz 1892 speech is much milder, and focuses much less on Goethe's theory of colours. On Helmholtz's assimilation of poetic and scientific thought, see also Hatfield (1993), Hallet (2009), and Meulders (2010).

³⁵ See for example Helmholtz (1995 [1892]), p. 399: "It seems to me indubitable that an artist's work can only succeed if the artist bears within himself a fine knowledge [...] of the presented phenomena, as well as with their effect on the listener or viewer. [...] [A]rtistic representation [...] must be a representation of the type of phenomenon concerned." The main point here is that the artist, like the scientist, produces representations by subsuming particular phenomena or events under the idea of a general *type*.

³⁶ Helmholtz (1995 [1892]), p. 395, 398. As an example of this 'poetic presentiment' in Goethe, Helmholtz refers to the Earth Spirit [Erdegeist] in Goethe's *Faust I*, who, according to him, presents an 'allegorical figure' of the law of the conservation of force. In this respect, Helmholtz refers to the night scene in *Faust I* (German quotation taken from Goethe (1977 [1808], p. 21); English translation by Constantine (2005, p. 20-21):

In Lebensfluthen, im Thatensturm	<i>On life tides, in a storm</i>
Wall' ich auf und ab	<i>Of deeds I rise and fall,</i>
Wehe hin und her!	<i>Weave here and there</i>
Geburt und Grab,	<i>For birth, for burial,</i>
Ein ewiges Meer,	<i>A sea for ever,</i>
Ein wechselnd Weben,	<i>A restless weaving,</i>
Ein glühend Leben,	<i>A fiery living,</i>
So schaff' ich am sausenden Webstuhl der Zeit,	<i>I work at the hurtling loom, I make</i>
Und wirke der Gottheit lebendiges Kleit.	<i>Of time God's living cloak</i>

In this scene, Helmholtz (1995 [1892]), p. 411) reads a poetic expression of the idea of 'force' as an "indestructible and unincreasable supply of energy or effective motor power [...] which, [...] constitutes the active force in each effect, both in [...] living nature and in inanimate bodies. The germs of this insight into the constancy of the value of energy were already at hand in the previous century, and could well have been

Although the meaning of artistic representation (its ‘inner truth’, as Helmholtz puts it), in contrast to scientific reasoning, is (i) not necessarily arrived at consciously, and (ii) not viable for expression in words [Wortfassung], Helmholtz maintains that artistic intuition [künstlerischen Anschauung] or artistic *presentiment* can grasp and present truths on a pre-conceptual level.³⁷ In the context of this exposition, we are especially interested in the way in which Helmholtz read particular scenes of Goethe’s *Faust I & II* as an artistic presentiment (or an allegorical presentation) of his own epistemological position in general, and his theory of perception in particular.

Helmholtz’s intense admiration for Goethe’s ‘divine poem’ [göttliche Dichtung] dates back to at least 1839, when he gives his father a very lively report of the performance of the play in Berlin in a letter, writing that the play had left him with “a sense of satanic weakness in the stomach.”³⁸ As Lenoir suggested, Helmholtz, in the two lectures mentioned, presents the tormented, truth-seeking Faust as a “proto-Helmholtz.” Surprisingly though, Helmholtz’s rhetorical invocation of *Faust* is rarely mentioned in the secondary literature.³⁹ Yet, his interpretation of three scenes of the play in particular, i.e. the *Dark Gallery* (*Faust I*), the *Chorus Mysticus* (*Faust II*), and the first *Study Room scene* (*Faust I*), provide an interesting introduction into the general outlines of Helmholtz’s philosophical position. A discussion of the latter’s interpretation of these scenes therefore presents us with the opportunity to give a ‘helicopter view’, so to

known to Goethe. [...] [T]he Earth Spirit should be the representative of organic life on Earth [...].” Helmholtz (1995 [1878b]), p. 365) wonders, “Has the poet intuited it?”

³⁷ See Helmholtz (1995 [1892]). According to Hatfield (1993, p. 524), Helmholtz’s 1892 lecture emphasizes “the intellectual content of artistic and aesthetic judgment,” and “effectively reduced intellect to imagination.” I am not sure, however, whether Helmholtz’s comparison of aesthetic and scientific thought is adequately described in terms of ‘reduction’. Rather, Helmholtz proposes a treatment of the (unconscious) artistic process as if it were a (conscious) intellectual one, with a form of inductive inference underlying both. Indeed, it seems that the content of the lecture is more appropriately described as an intellectualization of the imaginative process (as the first part of Hatfield’s statement suggests), rather than the other way around.

³⁸ Helmholtz to his father (1839), in Cahan (1993b), p. 62.

³⁹ Lenoir (1997), p. 177. Helmholtz’s relation to Goethe’s work has hardly received any scholarly interest, let alone his particular reading of *Faust*. In itself, Helmholtz’s love for poetry may be considered as quite a trivial biographical fact, and, as such, not relevant with regard to his theorizing. Furthermore, Goethe’s general philosophical outlook can be seen as diametrically opposed to Helmholtz’s anti-metaphysical stance. However, Helmholtz’s view on the affinity of artistic/poetic and intellectual insight suggests that poetry, for him, may provide an alternative way of looking at ‘scientific’ topics, broadly conceived. The discussion of the *poetic presentiment* which Helmholtz read in *Faust* with respect to his own theorizing, can therefore be considered as an alternative way of gaining insight into the broad outlines of the former’s thought.

speak, of the major themes, as well as the intellectual context in which they were embedded, which will be considered in detail in the next chapters.⁴⁰

1.2.1 The Realm of the Mothers: Faust in the *Dark Gallery*

*There is no way! Into the untrodden,
Not to be trodden, a way to the unbidden
The unbidable.*⁴¹

- Goethe (2005 [1832]), p. 54.

First of all, Helmholtz found in Goethe's *Faust* a poetic description of the fundamentally limited nature of human knowledge. Goethe's play famously unfolds from Faust's thirst for absolute knowledge, his melancholy over his insufficiency as a human being to ever obtain anything like it, and his readiness to overcome the latter by making a deal with the devil. At the very beginning of the play, the main character laments:⁴²

I have now, alas, [...] studied philosophy, jurisprudence and medicine, - and to my sorrow, theology too. Here I stand, poor fool that I am, just as wise as before. [...] and see that we can know nothing! This it is that cuts me to the heart.

In 1878, Helmholtz had already quoted a section from the poet's "The Limits of Humanity" in this respect, whereas in 1892, he takes the Dark Gallery [Finstere Galerie] scene from *Faust II* as a point of departure.⁴³ In the latter, Mephistopheles lets his pupil

⁴⁰ The order in which the scenes are discussed here does not follow the chronological unfolding of *Faust's* tragedy, but rather the order of the philosophical themes that Helmholtz introduced through them, from the most general ones, to his specific treatment of the problem of perception.

⁴¹ Goethe (2005 [1832]), p. 54.

⁴² Goethe (2005 [1808]), p. 7.

⁴³ For the Dark Gallery scene, see Goethe (1832 [1977]), p. 181-184, or Constantine's (2005) English translation, p. 52-57. The poem Helmholtz quotes in (1896 [1878b]), p. 245) is the following (English translation by Bowring (in Hedge & Noa, 1882, p. 174) :

Doch mit Göttern
Soll sich nicht Messen
Irgend ein Mensch.
Hebt er sich aufwärts
Und berührt
Mit dem Scheitel die Sterne,
Nirgens haften dann
Die unsicheren Sohlen,
Und mit ihm spielen
Wolken und Winde.

*For never against
The immortals, a mortal
May measure himself
Upwards aspiring, if ever
He toucheth the stars
with his forehead,
Then do his insecure feet
Stumble and totter and reel;
Then do the cloud and the tempest
Make him their pastime and sport*

in on the secret of the realm of the Mothers of Being, described as “Goddesses whom mortals don’t know and we are loath to name. [...] [T]he untrodden – the not to be trodden.”⁴⁴ In the context of the tragedy, they symbolize the unknown and the unknowable, and denote the obscure essence and origin of all things. The realm where the mothers are said to reside is described as a ‘vacancy, eternally remote’, that fills Faust with anxiety, but into which he nevertheless wishes to descend. In pondering upon Goethe’s Mothers of Being, Helmholtz quotes the following lines:⁴⁵

Um sie kein Ort, noch weniger eine Zeit	<i>No place around them, time still less;</i>
Von ihnen sprechen ist Verlegenheit	<i>To speak of them feels discourteous</i>

[...]

Nichts wirst du sehn in ewig leerer Ferne	<i>But in that vacancy, eternally remote</i>
Den Schritt nich hören, den du tust,	<i>Nothing you’ll see nor hear your taken step</i>
Nichts Fests finden, wo du ruhst!	<i>Nor find a solid footing when you stop.</i>

As Goethe describes the realm of the mothers as being outside of space and time, Helmholtz reads the scene as a poetic invocation of the Kantian thing-in-itself [Kant’s *Welt der Dinge an Sich*], which he in turn conceptually links to his own notion of the unknowable *Real* [das Reale].⁴⁶ At the very basis of his epistemology, Helmholtz

Steht er mit festen Markigen Knochen Auf der wohlgegründeten Dauernden Erde: Reicht er nicht auf, Nur mit der Eiche Oder der Rebe Sich zu vergleichen	<i>Let him with sturdy Sinewy limbs, Tread the enduring Firm-seated earth; Aiming no further, than The oak or the vine to compare</i>
--	---

⁴⁴ Goethe (2005 [1832]), p. 54.

⁴⁵ Goethe (1977 [1832]), p. 183, quoted in Helmholtz (1896 [1892]), p. 356; Constantine’s (2005) English translation, p. 54-55.

⁴⁶ Helmholtz (1896 [1892]), p. 356. As is well known, space and time, i.e. the *a priori* forms of intuition, are for Kant the primary conditions for something to be given in intuition. Hence, it is impossible for anything that is said to be beyond space and time, like Goethe’s ‘realm of the mothers’, to be an object of possible experience. See for example *CPR* [A49/B66]: “[S]pace and time, as the necessary conditions of all (outer and inner)

distinguishes this *Real* from the *Actual* [Wirklichkeit].⁴⁷ Helmholtz articulates the the distinction between both as follows:⁴⁸

We have in our language a very fortunate designation for that which [...] permanently influences us [auf uns einwirkt], namely: the actual [das Wirkliche]. Herein only the acting [das Wirken] is expressed; it is not related to existence as substance [bestehen als Substanz], which is included in the concept of the real, i.e. the thinglike.

Helmholtz's *Wirklichkeit* thus refers to the world of possible experience, while his *Realität* denotes unknowable, thinglike being. A similar distinction is made by Kant in the *Critique of Pure Reason* (*CPR*), in which the Prussian philosopher describes the Real (the first category of quality) as “the transcendental matter of all objects as things-in-themselves” (Kant, *CPR*, [A143/B182]), and juxtaposes it with Actuality (the second category of modality) as that which is “connected with the material conditions [i.e. everything provided through sensibility] for experience” (Kant, *CPR* [A218]).⁴⁹ For Helmholtz, the concept of the Real – as derived from the Latin ‘res’ – refers to permanent existence [dauernde Existenz] or subject-independent being, while Actuality, by contrast, is effective [wirkende] reality, or that which is capable of *acting upon* [wirken], or exercising an effect [wirkung] on human sensitivity.

experience, are [...] conditions of all our intuitions, in relation to which therefore all objects are mere appearances and not things given for themselves in this way; about these appearances, further, much may be said *a priori* that concerns their form but nothing whatsoever about the things in themselves that may ground them.” Also see chapter 4.

⁴⁷ See Helmholtz (1995 [1892]), p. 407: “Using the occasion of Faust’s trip to the ‘Mothers,’ he [Goethe] has unforgettably [...] described the aesthetic impression that ‘Kant’s world of things in themselves’ made on him.” For Helmholtz on the ‘Real’ see Helmholtz (1995 [1878b]), p. 361; 1995 [1892], p. 405).

⁴⁸ Helmholtz (1896 [1878b]), p. 241 [my translation]. The reality-actuality distinction was likewise made by Leibniz, Fichte, Schopenhauer and Lotze, among others. As such, the philosophical differentiation between both concepts was quite common in Helmholtz’s time, although it is not sure from whom he adopted the idea. For a historical overview of the philosophical use of the distinction between the Real and the Actual, see Eisler (1904), p. 788-793; and Falkenburg (2007). As was pointed out in the Herz/Schlick translation of Helmholtz’s *Die Thatsachen in der Wahrnehmung*, the English terms ‘Actuality’ and ‘Reality’ are quite adequate terms to replace the respective words used by Helmholtz, as Actuality incorporates the verb Acting in a similar way as Wirklichkeit contains Wirken (see Helmholtz, 1977 [1878b]). Unfortunately, the important distinction Helmholtz draws between *Wirklichkeit* and *Realität* is not always respected by translators. In David Cahan’s 1995 translation of Helmholtz’s work for example, the distinction is not always preserved, as both German terms are frequently translated as ‘reality’, which can be somewhat confusing or even misleading with respect to the interpretation of Helmholtz’s work. See for example Helmholtz (1995 [1878b]), p. 361 and p. 362. In relation to Kant, the same difficulties arise with regard to the English translation of his work; in this respect see Holzhey and Mudroch (2005).

⁴⁹ For Kant on the matter versus the form of experience, see for example *CPR* [A86/B118], [A266/B322].

Furthermore, Helmholtz adds, the Real is the hypothesized permanent *cause* [Ursache] behind visible appearances, and as such, he relates it to the *idea* of “a power [...] ready to take effect [zu wirken bereit] in every moment where the conditions for its efficacy [Wirksamkeit] occur,” i.e. to the notion of *Force*.⁵⁰

[S]ince [...] force maintains itself as ready and able to take effect in every moment, we ascribe a continuous existence to it. [...] [T]hereupon [...] rests the designation of force as the cause of changes that occur under its influence; it is the permanent being behind the change of phenomena. The meaning of the term ‘thing’ corresponds to the Latin *res*, from which the terms “real” and “reality” are derived.

Helmholtz thus associates the Real with substance and force, and therefore, his analysis of the concept of *Reality* automatically reminds one of the ontology of matter and force he presented in the introduction to his seminal 1847 paper *On the Conservation of Force*. In the latter, the joint action of matter and force is likewise put forward as the hypothesized cause of the quantitative and qualitative differences in visible appearances.⁵¹ However, it is important to grasp that Helmholtz maintained the unknowability of matter and force, and conceived of them as no more than scientific abstractions, whose hypothesized capacity to produce lawlike behavior on the phenomenal level cannot be hypostasized on the level of Actuality, but rather forms a necessary condition for the comprehensibility of nature as such.⁵²

[W]hen applied to nature, the concepts of matter and force cannot be distinguished. [...] [A] pure force would be something that must be there, and yet is not [etwas, was dasein sollte und doch wieder nicht dasein]. [...] [I]t would be likewise erroneous to explain matter as something actual [etwas Wirkliches]. [...] Both are rather abstractions from actuality [dem Wirklichen]. [...] One can therefore determine the task of the physical science of nature to be the reduction of natural phenomena to immutable [...] forces [...]. The possibility of this reduction is at the same time the condition of the complete comprehensibility of nature.

⁵⁰ Helmholtz (1995 [1892]), p. 407; Helmholtz (1896 [1892]), p. 354; also see Helmholtz (1995 [1869]), p. 209.

⁵¹ Helmholtz (1889 [1847]); also see Heimann (1974).

⁵² Helmholtz (1889 [1847]), p. 5-6. Also see Helmholtz (1995 [1854, 1869]). It is interesting to note that in his *CPR* [B249/A204-B255/A209], Kant puts forward a similar view on the conceptual intertwinement of the concepts of cause, matter and force: “[C]ausality leads to the concept of action, this to the concept of force, and thereby to the concept of substance. [...] Where there is action, consequently activity and force, there is also substance, and in this alone must the seat of this fruitful source of appearances be sought.” For an interesting discussion of the way in which Helmholtz’s theoretical conceptualization of matter and force can be said to be rooted in Kant’s critical project, see Heimann (1974).

In other words, to understand nature, for Helmholtz, is to reduce visible phenomena to the hypothesized lawlike action of *real* causes. Helmholtz thus concludes that the causal structure of understanding – which includes a reference to the Real as ‘Ur-sache’ – is an *a priori* condition of comprehensibility, or a “regulative principle of understanding.”⁵³ Although Helmholtzian Reality is not capable of (scientific and perceptual) representation as such, the mere act of representing presupposes causal reference to Reality (or a belief in mind-independent being as cause) as a condition of possibility. Hence, understanding, by virtue of its very structure, generates the (empty) concept of the Real qua cause [Ur-sache], in order to make sense of visible phenomena.

In 1892, Helmholtz conceptually links the Real to yet another Goethean notion, namely that of the *Urphänomen*. Goethe, Helmholtz states, was convinced that we have to seek “Ur-phenomenon, an ultimate event, to which the multiplicity of phenomena may be reduced.”⁵⁴ Helmholtz uses Goethe’s Ur-phenomenon to clarify his understanding of the Real as unknowable cause, and regulative point of reference for all objectifying thought. In Goethe’s work, the Ur-phenomenon is defined as “an ultimate which cannot itself be explained, which is in fact not in need of explanation, but from which all that we observe can be made intelligible,” and “the limit of our perception.”⁵⁵ As such, Helmholtz interprets the Ur-phenomenon as the hypothesized causal origin of phenomenal diversity, and a principle of comprehensibility. Hence, Helmholtz states that careful use of the notion of the Real “provides the great advantage of being a much shorter linguistic expression than the description of the Ur-phenomenon in statements about conditions.”⁵⁶

⁵³ For Helmholtz’s *a priori* conception of the causal law, see among others Helmholtz (1896 [1855], 1867 [1856/66, III], 1995 [1868], 1883 [1878a], 1995 [1878b], 1995 [1892], 1894). Helmholtz’s (Kantian-inspired) notion of causality will be further discussed in chapter 4.

⁵⁴ Helmholtz (1995 [1892]), p. 403.

⁵⁵ Goethe as quoted in Seamon & Zajonc (1998), p. 4, and Meulders (2010), p. 8. Helmholtz’s assimilation of Reality with the Goethean Ur-phenomenon seems to be based on nothing more than a superficial conceptual similarity. Actually, Helmholtz quite explicitly assimilated Goethe’s Ur-phenomenon to the mechanical force transformations that supposedly underlie the multitude of empirical phenomena, and interprets it as a ‘presentiment’ of his ontology of force and matter, as is made clear for example by Helmholtz (1995 [1892], p. 404): “Gustav Kirchoff begins his *Textbook of Mechanics* with the explanation: the task of mechanics is ‘to describe completely and in the simplest ways the movements taking place before one in nature.’ What Kirchoff [...] understands by the ‘simplest ways’ of description may, in my opinion, not lie so far from the Goethean ‘Ur-phenomenon’.” As such, he relates the Goethean concept to a mechanical, Newtonian world view, and it is very questionable that the romantic idealist would have approved of such an interpretation. While Goethe’s Ur-phenomenon is the result of an *abstraction to the ideal*, Helmholtz puts it on a par with a *mechanical reduction*. Hence, their respective use of the terms implies they have different methodologies as well as different epistemologies and worldviews.

⁵⁶ Helmholtz (1995 [1892]), p. 406.

So, for Helmholtz, the concepts of Reality, thing-in-itself and Ur-phenomenon in their most general sense all denote the general idea of being-in-itself, and hence, have no referent that can be described in positive terms, but forever remains a ‘vacancy, eternally remote’, to borrow Goethe’s terms. Albeit a vacancy, i.e. a mere logical possibility without a necessary external correlate, that is the point of reference for all experience and knowledge, but which “in the mouths of foolish people, [...] can lead to the wildest nonsense.”⁵⁷

Interestingly, it is only from the late 1870s onwards, that Helmholtz explicitly emphasized this inherently problematic nature of his notion of *Reality*. In trying to pinpoint the event that urged Helmholtz to clearly articulate his epistemological position towards being-in-itself, the criticism he received in 1877 of the Kantian philosopher J.P.N. Land, seems to have played a pivotal role. In the latter’s article in *Mind* from May 1877, he accuses Helmholtz of defending an uncritical account of the Real, and, more precisely, of identifying the experienced object with the idea of a real thing.⁵⁸ In Helmholtz’s April 1878 response to Land, the first clear statement can be found of his critical standpoint towards the metaphysical status of *Reality*.⁵⁹ Helmholtz acknowledges that he takes the reduction of phenomena to “a variety of Real conditions [reellen Bedingungen]” to be a condition of comprehensibility. But, he adds:⁶⁰

We do not know anything about these very conditions, about the actual Real [eigentlich Reelle], that underlies appearances; all opinions [Meinungen] that we entertain in this respect are to be considered as [...] probable hypotheses. The preceding presumption [i.e. of the causal *structure* of understanding], however, is a fundamental law of our thought [Grundgesetz unseres Denkens]; if we were to give it up, we would thereby repudiate our very capacity to think conceptually about these relations [diese Verhältnisse denkend begreifen zu können]. I emphasize that we do not make any assumptions about the nature of the conditions under which our representations arise. The hypothesis of subjective idealism [...] could be just as admissible as the realistic perspective. We could assume all our perceiving to be but a dream [...].

In other words, the Real is merely *thought of* as being the ultimate ground of the whole of Actuality. We act and think, Helmholtz states elsewhere, “as if the world of

⁵⁷ Helmholtz (1995 [1892]), p. 406.

⁵⁸ Land (1877) wrote his article in response to Helmholtz’s 1870 refutation of Kant’s *a priori* conception of space. In it he writes that Helmholtz conflates – as any other scientist, in his view – the real and the objective, and that his refutation is therefore invalid. On Helmholtz’s criticism with regard to space, see chapter 4.

⁵⁹ Helmholtz (1883 [1878a]). For other articulations of this critical view, see for example Helmholtz (1995 [1878b], 1995 [1892], 1894).

⁶⁰ Helmholtz (1883 [1878a]), p. 656 [my translation].

material things assumed by the realistic hypothesis may really exist. However, we do not overcome this ‘as if’ [...].”⁶¹

Notwithstanding Helmholtz’s quite straightforward articulation of his philosophical position in this respect, his attitude towards the metaphysical status of the Real has been interpreted in a number of different ways. Most scholars agree that there was an evolution in Helmholtz’s epistemological stance on this matter, for which his 1878 lecture *The Facts of Perception* marked a turning point.⁶² Based on textual evidence, however, it seems more reasonable to assume that the ‘turning point’ should be dated back to his response to Land’s criticism, published a few months before the aforementioned lecture. Furthermore, it is interesting to note that Helmholtz himself considered his exposition of the Real in his response to Land to be a clarification, and not a correction of his former views.⁶³ That is to say, he maintained that although he might have expressed much of his theorizing in a ‘realistic language’, he had actually always considered realism to be no more than a problematic hypothesis, although it was only in reaction to Land’s criticism that he felt compelled to clearly articulate his position in this respect.⁶⁴ In any case, it is clear from the statements above that the ‘mature’ Helmholtz explicitly distanced himself from robust metaphysical realism. Some interpreters have gone so far as to characterize the evolution in his thought as a growing tendency towards anti-realism or scepticism.⁶⁵ It can be questioned, however, that the principled decision to refrain from making any positive statements with regard to the metaphysical status of *being-in-itself* (whether to affirm its existence or non-existence) should suffice to call one a sceptic. Therefore, it seems preferable to characterize Helmholtz’s position as hypothetical realism or critical realism.⁶⁶

1.2.2 The Symbolic Relation to the World: *Chorus Mysticus*

Helmholtz’s most fundamental epistemological assumption, as sketched in the previous section, can be said to epitomize what Foucault once called modernity’s ‘most radical epistemological event’, i.e. the assumption of a radical discontinuity between “things, with their own organic structures, their hidden veins, the space that articulates them, the time that produces them” on the one hand, and “representation, [...] in which those

⁶¹ Helmholtz (1995 [1878b]), p. 360.

⁶² See for example Schwertschlager (1883), Hatfield (1990), Schiemann (2009).

⁶³ See Helmholtz (1883 [1878a]), p. 655.

⁶⁴ Helmholtz (1883 [1878a]).

⁶⁵ See for example Schwertschlager (1883), Leroux (1997).

⁶⁶ Heidelberger (1993); Schiemann (2009); Leidlmair (2009).

things address themselves [...] to a subjectivity, a consciousness, a singular effort of cognition, to the psychological individual [...] who is trying to know” on the other.⁶⁷ In contrast to classical philosophy, modern man lost his inherent connection to the divine, subject and object are alienated from one another and conceived of as two radically different spheres. It is exactly in this sense that Faust has been described as ‘the first modern philosopher’, and the impersonation of the modern insight into the finite and conditioned nature of human knowledge.⁶⁸ According to Brown, for example, the tragedy incorporates the central tenets of “German philosophy in Goethe’s day [...] preoccupied with the gap between the subject, the self in its capacity as perceiver, and the object or non-self.”⁶⁹

In Helmholtz’s work, this ‘radical event’ is implied in his firm rejection of the (Leibnizian) idea of a pre-established harmony between subject and object:⁷⁰

[R]epresentation and that which is represented [...] belong to [...] entirely different worlds, which have as little in common as the letter of a book with the sound of

⁶⁷ Foucault (1989 [1966]), p. 260. The radical event is described by Foucault as the scattering of the mirror-metaphor, or the bankruptcy of ‘resemblance’ as the structuring symbol of knowledge. See for example Foucault (1989 [1966], p. 19): “Up to the end of the sixteenth century, resemblance played a constructive role in the knowledge of Western culture. [...] [I]t was resemblance that [...] made possible knowledge of things visible and invisible, and controlled the art of representing them. The universe was folded in upon itself: the earth echoing the sky, faces seeing themselves reflected in the stars, and plants holding within their stems the secrets that were of use to man [...]. And representation [...] was posited as a form of repetition: the theatre of life or the mirror of nature, that was the claim made by all language, its manner of declaring its existence and of formulating its right of speech.” This move away from the mirror-metaphor in modernity, according to Foucault, correlated with an intensive problematization of the epistemic subject as the necessary mediating factor of all knowledge. This description of the hallmark of modern thought resonates with Cassirer’s (1951 [1932], p. 23) conception of modernity as the era born from the loss of a unity principle. More particularly, Cassirer writes that there was a gradual deterioration of the “rationalistic postulate of unity,” that gradually ‘lost its grip’ from the eighteenth century onwards (also see for example Cassirer 1922, 1969 [1950] and Abrams, 1953).

⁶⁸ Redner (1982), p. 42.

⁶⁹ Brown (2002), p. 84.

⁷⁰ Helmholtz (1867 [1856/1866], III), p. 443. The concept of pre-established harmony is derived from Leibniz’s (2004 [1695], p. 77) assumption that subject and object correspond with each other like “two clocks or watches which perfectly agree.” Also see for example Leibniz (2006 [1695], p. 74-75): “God first created the soul, [...] so that everything must arise in it from its own nature, by a perfect spontaneity with regard to itself, and yet with a perfect conformity to things outside it. [...] [I]nternal perceptions in the soul itself come about through its own original constitution, that is to say through the representative nature [...] which it was given at its creation [...] And this is what makes [...] the perceptions and expressions of external things occur in the soul. [...] [T]he series of representations that the soul produces in itself will naturally correspond to the series of changes in the universe itself.” For Helmholtz’s criticism of the doctrine of pre-established harmony, see also Helmholtz (1995 [1868, 1870, 1878b]).

the words which they signify. [...] Our representations of things cannot be anything other than symbols, [...] signs for things that we have learned to use.

Likewise, concerning the level of sensibility, Helmholtz states:⁷¹

I have thus believed it necessary so to formulate the relationship between the sensation and its object such that I would interpret the sensation only as a sign [...]. [...] [N]o type of similarity is necessary between it and its object, just as little as that between the spoken word and the object that we designate thereby.

The radical fissure between subject and object thus amounts to a conception of their epistemological relation as a semiotic one: the affirmation of objective existence is the result of a process of signification by an interpreting subject. Consequently, the problem of the object in epistemology and perceptual theory is established as correlative with that of the interpreting subject. More specifically, the foundational problem of perception, for Helmholtz, is that of unraveling the “mental function” or the “acts of apprehension” that underlie the genesis of the awareness of the thing as a spatially extended entity, dynamically distinct from, and opposed to the perceiving subject.⁷²

Here again, Helmholtz states, “we find Goethe along with us on the same road.” More particularly, in the context of his semiotic understanding of the subject-object relation, he quotes the very last verse of the last scene of Goethe’s tragedy, the Chorus Mysticus, approvingly:⁷³

Alles Vergängliche	<i>All things transitory</i>
Ist nur ein Gleichnis;	<i>but as symbols are felt</i>
Das Unzulängliche,	<i>the insufficiency</i>
Hier wird’s Ereignis	<i>here grows to event</i>

It is true, Helmholtz affirms, that all that “happens in space and time, [...] we know only as a symbol [Gleichnis].”⁷⁴ To be sure, the German notion of *Gleichnis* has a much

⁷¹ Helmholtz (1995 [1868]), p. 149; Helmholtz (1995 [1892]), p. 408.

⁷² Helmholtz (1995 [1868]), p. 127.

⁷³ Goethe (1977 [1832]), p. 351; the English translation is taken from the 1871 Bayard Taylor translation (p. 392). The latter translation is much more adequate than the Constantine translation used hitherto, which translates the relevant passage as follows: “Time-dying things are a likeness, a hint; falling short there, here the event.” (Goethe (2005 [1832]), p. 253). The crucial word here is “Gleichnis,” which, as explained above, is very difficult to translate into English. I do not agree with Cahan’s (1995) decision to adapt the Bayard Taylor version exactly on this point in his translation of the 1878b and 1892 Helmholtz lectures. To translate “Gleichnis” as “image,” as Cahan (1995, p. 362, 409) does, is not compatible with Helmholtz’s rejection of the ‘image’ [Bild] conception of sensation, and as such, the translation of ‘Gleichnis’ as ‘Image’ invites serious misunderstandings with regard to Helmholtz’s epistemological viewpoint.

⁷⁴ Helmholtz (1995 [1892]), p. 409.

broader meaning than that of the English ‘likeness’, and can be used to denote metaphors, parables and symbols. But it seems that *Gleichnis* in this context must indeed be translated as symbol, as Helmholtz vehemently opposed the idea of sensation and knowledge as an *image* [bild], i.e. a copy-like picture of reality (see chapter 2).

The last two lines of the verse quoted above, Helmholtz reads as a poetic articulation of the differentiation between the Real – in the face of which we feel our insufficiency – and the Actual, here denoted as ‘event’ [Ereignis], or that which affects through sensible stimulation [Erregung].⁷⁵ To be more precise, given that the object is the result of an ongoing process of signification, it follows that it is never completed, and, as such, is fundamentally ‘insufficient’ [Unzulänglich], viable to correction and reinterpretation.⁷⁶ As human beings, we are restricted to the total of ‘all things transitory’, never to grasp the essence of the thing-in-itself (or, in Goethe’s terms: never to enter the realm of the Mothers), and as such, “earthly thought is first justified by the occurring event [Ereignis].”⁷⁷

As some commentators have noted, the isolated and estranged nature of Faust can be seen as an allegorical representation of what Foucault denoted as modernity’s ‘radical event’. In the description of the physical spaces in which Faust finds himself, the reader is easily overcome by a sense of claustrophobia. The tormented scholar’s quest for knowledge takes place successively in the darkness of the night, the confined space of his study room (described as a “cell,” a cold and desolate “dungeon”), a cellar, and a cave.⁷⁸ Mauleuvre, for example, interpreted this claustrophobic staging of Goethe’s tragedy as a metaphorical depiction of the drama of modern subjectivity, which unfolds from the realization that “the mind never sees farther than its own nose.”⁷⁹ As such, the tragedy can be said to unfold from the modern insight into the *relativity* of knowledge, i.e. the assumption that every being is a being *for* consciousness, that does not necessarily correlate with an object or event in a mind-independent world, but is constructed within the limited sphere of finite subjectivity. “That mind is yours and it reveals only its own reflection, [...] [is this] what they call knowing?” Faust complains, thus echoing the general epistemic anxiety – to borrow Daston and Galison’s term – that

⁷⁵ It is possible that Helmholtz reads Goethe’s Ereignis in terms of sensation, which he denotes as *Reizung* and *Erregung*. See Helmholtz (1896 [1868]), p. 296.

⁷⁶ Helmholtz (1995 [1878b]), p. 363; Helmholtz (1995 [1892]), p. 409. The ‘insufficiency’ of the perceptual process, according to Helmholtz, can be linked to his conception of perception as inductive inference (see chapter 3).

⁷⁷ Helmholtz (1896 [1892]), p. 359.

⁷⁸ Goethe (2005 [1808]), p. 17, 43.

⁷⁹ Mauleuvre (2011), p. 231; This aligns with what Brown (2002) and Cooksey (2006) wrote on this topic.

taunted his era.⁸⁰ Although Faust desperately seeks to unravel “never-ending nature,” he complains that he is “nothing like the gods,” but rather like “the worm, that works the dust. And living in dust and by dust fed.”⁸¹ “Here I am, [...] poor fool as I ever was,” the main character laments in the opening scene.⁸² Faust’s longing for the infinite, the divine and the absolute, correlates with (and is frustrated by) the tragic insight in his own finite nature, and one could thus read Goethe’s tragedy as lending a voice to what Hegel once called modern man’s *unhappy consciousness*.⁸³ Faust expresses his hope to escape “into a wider land,” “rise to the surface in this sea of error” to which he is condemned by his human condition, but finds he “has no wings to lift [him] up.”⁸⁴

Although Helmholtz’s work incorporates this negative Faustian theme, he does not, however, accept its catastrophic conclusion with regard to the possibility of knowledge. Although there is indeed no pre-established harmony between subject and object for Helmholtz, his theorizing is not an affirmation of that gap, but rather an attempt at bridging it, or at least, at determining the constructive and constitutive conditions underlying the genesis of the notion of thinghood, and, more generally, the possibility of objective representation. This brings us to a discussion of Helmholtz’s interpretation of the first study room scene in *Faust I*, that describes the main character’s attempt to address the question of *What was there in the beginning?*

1.2.3 What was There in the Beginning? The First Study Room Scene

From Helmholtz’s semiotic understanding of the subject-object relation, it follows that his psychological approach to the object can be considered as an attempt to address the question of *the origin of meaning*. In the context of his interrogation of the conditions

⁸⁰ Goethe (2005 [1808]), p. 23; Daston & Galison (2007).

⁸¹ Goethe (2005 [1808]), p. 25.

⁸² Goethe (2005 [1808]), p. 16.

⁸³ The term ‘Unhappy Consciousness’ is used by Hegel to denote sceptical and cynical consciousness, defined as follows: “The Unhappy Consciousness, [...] is [...] the tragic fate of the certainty of self that aims to be absolute. It is the consciousness of the loss of all essential being in this certainty of itself, and of the loss even of this knowledge about itself [...] [I]t is the grief which expresses itself in the hard saying that ‘God is Dead’. [...] [T]he Unhappy Consciousness is the knowledge of this total loss. [...] Trust in the eternal laws of the gods has vanished, and the Oracles, which pronounced on particular questions, are dumb. The statues are now only stones [...]. The tables of the gods provide no spiritual food and drink, and in his games and festivals man no longer recovers the joyful consciousness of his unity with the divine.” (Hegel, 1998 [1807], p. 455).

⁸⁴ Goethe (2005 [1808]). p. 18, 38.

underlying the genesis of the meaning-object, Helmholtz appeals to the first study room scene of *Faust*.⁸⁵

In the first study room scene, Goethe's main character ponders the translation of the opening line of the gospel of St. John, namely 'In the Beginning was the Word'. The scene contains an interesting reflection on *What was there in the beginning*, and is a testimony of Faust's struggle with the riddle of the creation of the world [act der Weltschöpfung].⁸⁶ According to Helmholtz, in this passage in *Faust* the main character seeks to save himself "from the unsatisfactory condition of the knowledge and brooding going on inside himself [in sich selbst gewendeten Wissens und Grübelns]."⁸⁷ In other words, from Helmholtz's perspective, Faust's struggle with the first line of the gospel metaphorizes his search for a way out of the dungeons, narrow cells and caves of his epistemic insulation. In accordance with his general perspective, Helmholtz interprets the scene as an attempt to answer the question of how we first escape the world of symbols [Gleichnisse] and enter the world of Actuality, or, in short, as an allegorical expression of the philosophical question of the origin of the object in experience.⁸⁸

The relevant scene goes as follows:⁸⁹

Geschrieben steht: "Im Anfang war das Wort! "	<i>It is written: "In the beginning was the Word."</i>
Hier stock ich schon! Wer hilft mir weiter fort?	<i>Here I am already at fault. Who'll help me on?</i>
Ich kann das Wort so hoch unmöglich schätzen,	<i>I cannot possibly value the Word so highly,</i>
Ich muss es anders übersetzen,	<i>I must translate it differently</i>
Wenn ich vom Geiste recht erleuchtet bin	<i>If I am truly inspired by the spirit.</i>
Geschrieben steht: Im Anfang war der Sinn.	<i>It is written: 'In the beginning was the Sense'.</i>
Bedanke wohl die erste Zeile,	<i>Consider well the first line</i>
Dass deine Feder sich nicht übereile!	<i>That your pen be not over hasty</i>

⁸⁵ Interestingly, this particular scene has been interpreted by Cooksey (2006, p. 129) as pertaining to the problem of meaning in modern philosophy: "Faust's attempt to translate [...] the Gospel of John summarizes and reiterates his and western philosophy's struggle to resolve the problem of meaning."

⁸⁶ Helmholtz (1995 [1892]), p. 409

⁸⁷ Helmholtz (1995 [1892], p. 409; 1896 [1892], p. 359).

⁸⁸ Helmholtz (1896 [1892]), p. 359.

⁸⁹ Goethe (1977 [1808]), p. 40; Goethe (1871 [1808]), p. 40 [boldface added]. Again, the Bayard Taylor translation is used here, but instead of translating 'Tat' as 'Deed', we use 'Act'.

Ist es der Sinn, der alles wirkt und schafft?	<i>It is the Sense that influences and produces everything?</i>
Es sollte stehn: Im Anfang war die Kraft!	<i>It should stand thus: 'In the beginning was the Power!'</i>
Doch auch indem ich dieses niederscheibe,	<i>Yet, in the very act of writing it down,</i>
Son warnt mich was, dass ich dabei nicht bleibe.	<i>Something warns me not to keep to it</i>
Mir hilft der Geist! Auf einmal seh ich Rat	<i>The spirit comes to my aid! At once I see my way,</i>
Und schreibe getrost: Im Anfang war die Tat!	<i>and write confidently: 'In the beginning was the Act'.</i>

In 1892, Helmholtz indicates the way in which this scene resonates with his theory of perception, and analyzes it as follows:⁹⁰

He [Faust] runs up against the much-discussed concept of the *Logos*: “In the beginning was the word.” The word is only a sign of its meaning; this must be meant; the meaning of a word is a concept, or, if it refers to something that happens, a natural law, which, as we saw, when it is conceived as continuous and effective is designated as force [Kraft]. There thus lies in this transition from word to meaning, and then to force, which Faust makes in his attempt at translation, [...] a continuous, further development of the concept. However even force does not satisfy him. He now makes a decisive intellectual leap [einen entschiedenen Gedankensprung].

In accordance with this interpretation, with every attempt Faust makes at a translation (successively word/ meaning/ force/ act), he comes one step closer to solving the riddle of the object. As “the word is only a sign of its meaning [Sinn],” Helmholtz writes, Faust is right in dismissing it as the point of origin. Within his theory of perception, sensation is nothing but a sign that is not inherently related to the object. Meaning [Sinn], in turn, has to be *meant*, i.e. implies a transition from signs to meaning. In other words, the meaning-object is *the product* of signification, not its origin. The transition from word to meaning, Helmholtz continues, is only possible through subsumption under a general concept or law, which is designated as Kraft [force]. That is to say, the meaning-object arises from the moment that a sensible effect [Wirkung] is related to a hypothesized cause [Wirksamkeit]. But then again, the question remains how this subsumption is possible in the first place. In order to account for the origin of

⁹⁰ Helmholtz (1995 [1892]), p. 364.

the meaning-object, Helmholtz finally agrees with Faust, viz. we have to make a “decisive intellectual leap,” and turn to the *act*.⁹¹ Helmholtz concludes:⁹²

The epistemological counterpart to this scene lies in the efforts of the philosophical schools to establish belief in the existence of reality, efforts that must remain unsuccessful so long as they proceed only from passive observations of the external world. [...] [T]hey did not recognize that human actions, which are posited by the will, form an indispensable part of our sources of knowledge. [...] [I]n order to become sure of reality, even an epistemology based on [...] physiology [...] has to instruct humans how to proceed to act.

As will become clear in the next chapters of this dissertation, the Helmholtzian interpretation of Goethe’s intellectual leap can be interpreted in a narrow sense and in a more general one. In the narrow interpretation, the ‘act’ refers to Helmholtz’s conception of voluntary action, or active experimentation as a ‘generalized epistemological strategy’.⁹³ The possibility of objectivity in general and the appearance of a perceptual object in particular, in Helmholtz’s theorizing, require active experimental interaction with the world, as it is only in this way that an encounter can take place with “a power equivalent to our will, [...] a power opposing us.”⁹⁴ The act in this sense refers to what Heidelberger has called Helmholtz’s ‘experimental interactionism’ with regard to the possibility of object construction.⁹⁵

More generally, however, the scene indicates Helmholtz’s insistence on the constructive activity and constitutive spontaneity required to progress from mere sensation-signs, to object-meanings. To be more precise, the object, for Helmholtz, is the result of an *a posteriori* constructive process based on past experience, a process that is, however, crucially dependent upon *a priori* conditions of possibility. Helmholtz’s intellectual leap in the context of his psychology of the object, is thus a leap to the active subject, conceptualized as such on different levels of analysis that can be associated respectively with British and Scottish empiricism, Kant and Fichte.

The discussion of Helmholtz’s reading of *Faust* has provided us with the opportunity to sketch the broad outlines of Helmholtz’s epistemological position and theory of perception, and to create a ‘poetic presentiment’, to use Helmholtz’s words, for the

⁹¹ Helmholtz (1995 [1892]), p. 410; Helmholtz (1896 [1892]), p. 359.

⁹² Ibid.

⁹³ McDonald (2003).

⁹⁴ Helmholtz (1995 [1878b]), p. 361.

⁹⁵ Heidelberger (1993); for the significance of the ‘experiment’ in Helmholtz’s thought, also see McDonald (2003). A full discussion of Helmholtz’s experimental interactionism will be presented in chapter 5.

chapters to come. With Helmholtz's leap, we have reached the end of the preliminary 'helicopter view' that provides us with a compass for the chapters to follow, in which all the elements discussed here will be treated in more detail, and placed in their relevant contexts. The guiding research question in this investigation pertains to the motives that lead Helmholtz to his intellectual leap, i.e. his progressive problematization of epistemic subjectivity in the course of his psychological analysis of the object. To that end, a general historical-systematic framework is introduced that serves as a heuristic tool for systematizing the inquiry to follow.

1.3 General Aim and Strategy

1.3.1 Main Research Question

As already mentioned in section 1.1.2, Helmholtz's psychological treatment of the object has been described as a 'dovetailing', or an attempt to 'reconcile' empiricism and transcendentalism.⁹⁶ In this respect, Helmholtz's idiosyncratic allegiance to Kant's critical philosophy has raised particular interest ever since the nineteenth century.⁹⁷ Helmholtz's indebtedness to Johann Gottlieb Fichte's thought has likewise received some scholarly attention, but this dimension of Helmholtz's thinking remains gravely underappreciated up to this day.⁹⁸ Furthermore, there are major differences of opinion regarding the correct interpretation of Helmholtz's peculiar combination of these philosophical perspectives. The general aim of this dissertation is to address these interpretative problems, by presenting an analysis of the way in which empiricism, Kantianism and Fichteanism can be considered as different levels of analysis in Helmholtz's attempt to account for the origin and ground of the perceptual object. The leading hypothesis in this endeavor is that the progression from one level of analysis to another correlates with an increasing problematization of the experiencing subject. To that end, a historical-systematic discussion will be presented of the empiricist, Kantian and Fichtean analysis of experience, in order to grasp not only the doctrinal content of their theorizing and the way in which these inspired Helmholtz, but likewise to gain

⁹⁶Hamner (2003); Westheimer (2008). Also see section 1.1.2.

⁹⁷In the last decades of the nineteenth century alone, a number of monographs appeared in Germany, entitled *Helmholtz und Kant*; see for example Krause (1878), Joseph Schwertschlager's (1883), and Ludwig Goldschmidt (1898).

⁹⁸See for example Heidelberger (1993, 1994). Also see chapter 5.

insight into the aporetic corners of their respective systems, which in turn provide a motive for a shift from one level of analysis to another. When considered from this perspective, the three seemingly antagonistic perspectives united in Helmholtz's work soon appear to be systematically related as complementary ways of interrogating the problem of the object. As such, this dissertation aims at constructing a historical framework that enables a systematic insight into Helmholtz's empirico-transcendentalist approach to the perceptual object, and into the internal dynamics of his proto-psychology.

1.3.2 The Problem of the Object: Interpretive Framework

"We use sensations," Helmholtz writes in the introduction to the third part of his *Treatise*, "to form representations [Vorstellungen] about the existence, the form and position of external objects."⁹⁹ Hence, he adds, the psychological part of perceptual theory investigates "the genesis and coming into consciousness of representations [Vorstellung]," and the "laws and nature of the mental acts" that underlie the perceptual process.¹⁰⁰ The appearance of an object, Helmholtz further explains, is "an act of our power of realization" and therefore a "mental function."¹⁰¹ Helmholtz's psychology thus starts from the assumption that in order to progress from mere subjective sensation to objective perception, an interpretive act is required on the part of the subject: "We can never escape from the world of our sensations to the idea of an external world [Vorstellung von einer Aussenwelt], except by an inference."¹⁰² Within the semiotic framework of Helmholtz's theorizing, the problem at stake is reformulated as follows:¹⁰³

A peculiar intellectual activity is required to pass from a nervous sensation to the conception of an external object, which the sensation has aroused. The sensations of our nerves of sense are mere symbols indicating certain external objects, and it is usually only after considerable practice that we acquire the power of drawing correct conclusions from our sensations respecting the corresponding objects.

Helmholtz's psychology, that is the focal point of this investigation, aims at grasping the exact nature and structure of the 'intellectual activity' involved in perceptual

⁹⁹ Helmholtz (1867 [1856/1866], III, p. 427; 1896, III, p. 576).

¹⁰⁰ Helmholtz (1896), p. 576-577.

¹⁰¹ Helmholtz (1995 [1868]), p. 127.

¹⁰² Helmholtz (1867 [1856/1866], III), p. 453.

¹⁰³ Helmholtz (1995 [1857]), p. 66.

objectification. In a most general sense, the levels of analysis in this endeavor can be clarified by means of the following basic questions with regard to the structure and ground of perceptual understanding, that will be discussed subsequently in chapters 3 to 5:

- (i) Empiricism or the problem of psychological construction: What is the nature of the psychological process guiding the construction of meaning-objects from (the combination of) sign-sensations? Or in other words: what is the structure of a *posteriori* perceptual apprehension?
- (ii) Critique or the problem of the subject (I): What should *the mind or subject be like* in order to explain the ability of semiotic construction? Or in Kantian terms: In which way is the perceptual apprehension of sensitive matter necessarily determined by the *a priori* form of understanding?
- (iii) Metacritique or the (radicalized) problem of the subject (II): What is the subjective ground of the experienced duality between the *apprehension* of the object and the *apprehending* subject? What grounds this theoretical distinction and the capacity for differential consciousness? Whereas this duality is assumed at the critical level, it is the point of departure of the metacritical level.

As already mentioned, these levels of analysis are linked historically to eighteenth- and nineteenth-century empiricist theories of the object, Kant's critical analysis, and Fichte's metacritical expansion of the Kantian project. Furthermore, as each of these levels (except for the first one) takes as its point of departure the problems inherent to the previous one, they are not only related historically, but also systematically. To clarify this general framework, the three levels of analysis, including the way in which they relate to each other, as well as Helmholtz's theorizing, are captured in the following sketch.

1.3.2.1 Helmholtz and Empiricism: The Problem of Psychological Construction

As will be discussed in detail in chapter 3, the first level of analysis of Helmholtz's psychology of the object resonates with J.S. Mill's psychological account of the belief in the external world.¹⁰⁴ This theory can in turn be linked systematically to Hume's

¹⁰⁴ In this context, especially J.S. Mill's (1878 [1865], p. 188-239) *Psychological Theory of the Belief in an External World* is relevant. For Helmholtz's indebtedness to Mill, see for example Boring (1850, p. 304): "Helmholtz stood for psychological empiricism. He belongs thus systematically more with British thought than with German, in the tradition of John Locke down to the Mills" With regard to his theory of perception, Boring

empirical treatment of the belief in external bodies as presented in his *Treatise of Human Nature*, which compels us to include the Scottish sceptic in the discussion.¹⁰⁵ Most generally, the problem of the object in Mill's and Hume's theorizing, is approached as a question pertaining to the genesis of an informational mental content, or belief. Both argue that the psychological affirmation of external existence is identical to the acquiring of a belief, constructed by means of associative processes and previous experience. Accordingly, their methodology has been described as methodological naturalism, i.e. an approach of mental phenomena based upon (a) the decomposition of complex mental contents into more primitive parts (sensations) and (b) their theoretical reconstruction by means of general laws (the laws of association).¹⁰⁶ Indeed, Helmholtz's psychology can partially be understood against the background of these theories, as Hatfield, Boring and Hochberg, among others, have claimed.¹⁰⁷ More particularly, Helmholtz does conceive of perception as a constructive, associative process, based upon learning and experience.¹⁰⁸

However, in both Hume's and Mill's theoretical accounts, the psychological problem of the object is completely dissociated from the correlative problem of the representing subject. Hence, both their theories face serious problems when it comes to articulating one of the founding assumptions of their associationist psychology, i.e. the active and unitary subject that is implied in their accounts, but cannot itself be accounted for in terms of the associative construction. Strikingly enough, both Hume and Mill explicitly distanced themselves from what we may call the problem of epistemic subjectivity; the former by stating that "this difficulty is too hard for my understanding," the latter by

(1850, p. 313) writes that "Helmholtz in all these matters was influenced by John Stuart Mill," and that his thought on the subject was "consonant with Mill's view that objectivity depends upon the conception of the permanent possibilities of sensation." Boring's quite robust assimilation of Helmholtz's and Mill's thinking aligns with Hochberg (2007), but is in itself quite uncommon. Most scholars have a more moderate view on Helmholtz's indebtedness to Mill (e.g. Hatfield, 1990; Schiemann 2009).

¹⁰⁵ Hume (1969 [1739/40]).

¹⁰⁶ The introduction of this method into the study of the mental realm has been of utmost importance with regard to the emergence of psychology as a scientific discipline. Wilhelm Wundt for example, the founder of modern empirical psychology, was significantly influenced by Mill's method. See for example Schmidgen (2003): "Wundt's first project for a scientific psychology [...] was inspired by John Stuart Mill's *A System of Logic* [...], an epistemological work that takes many of its concrete examples from chemistry. [...] Wundt saw the principal aim of experimental psychology as "the complete decomposition [Zergliederung] of conscious phenomena into their elements" (Wundt, 1882, p. 399). Psychological research in that sense was nothing but 'psychological analysis'. For the influence of Mill on the development of scientific psychology, also see Boring (1950) and Robinson (1986).

¹⁰⁷ Boring (1950); Hatfield (1990); Hochberg (2007).

¹⁰⁸ The empiricist dimension in Helmholtz's theorizing, particularly his allegiance to J.S. Mill's psychology, have been emphasized by Boring (1950) and Hochberg (2007). For Helmholtz's relation to the British and Scottish empiricist tradition, also see Schiemann (2009) and Wegener (2009).

describing it as an “inexplicable mystery.”¹⁰⁹ As will be argued in detail in chapter 3, strict empiricism’s lack of reflective space with regard to the question of *how the subject has to be thought* so that it may be endowed with the capacity to associate its way into the notion of an external world, has been heavily criticized, as it leaves the empiricist account of the object lacking a foundation. Within the scope of our investigation, it is this fundamental weakness of psychological associationism that prompts us to shift the scope to another level of analysis.

1.3.2.2 Helmholtz and Kant: The *A priori* Structure of Understanding

The problem of epistemic subjectivity in empiricism requires us to take an ‘intellectual leap’ – to borrow Helmholtz’s terms – to another perspective; a leap that was taken by Kant in his critical analysis of experience and knowledge. As Brook has summarized it, the Prussian philosopher’s project can be said to unfold most generally from the insight that “experience needs a subject.”¹¹⁰ Kant never opposed what he called the ‘physiology of understanding’ and the associationist account.¹¹¹ Rather, he argued that the genetic decomposition and reconstruction of the perceptual object simply does not (and cannot) answer the question as to what makes experience possible in the first place.¹¹² Without a subject there simply is no experience, and no representation; a subject, that is, conceived of as:¹¹³

[T]he aspect of a system of representations that does the judging (interpreting) and recognizing [...] that can take representations up, let representations go, transform representations into new representations without itself changing [...]. It is able to refer to itself, indeed to itself as itself, [...] is aware of multiple objects as one object [...] and of itself as [...] aware of them all [...].

¹⁰⁹ Hume (1969 [1739/40]), p. 678; Mill (1878 [1865]), p. 262.

¹¹⁰ Brook (1994), p. 25.

¹¹¹ Kant, *CPR* [AIX].

¹¹² See Kant *CPR* [B127]: “[H]e [Hume] could not explain at all how it is possible for the understanding to think of concepts that in themselves are not combined in the understanding as still necessarily combined in the object, and it never occurred to him that perhaps the understanding itself, by means of these concepts, could be the originator of the experience in which its objects are encountered.” Also see Hatfield (1992, p. 64): “His [Kant’s] aim in framing an explicit distinction between naturalistic and what he termed ‘transcendental’ approaches to thought and the mental was not to deny the possibility of a naturalistic account of mind: he endorsed the legitimacy of the naturalistic approach, affirming that everything within the purview of human experience is subject to natural law, including the mental. But he also asserted that knowledge of the natural laws of the mind would not provide an understanding of thought [...]. In order to understand the latter, Kant contended, a philosophical, or critical, or transcendental investigation is required.”

¹¹³ Brook (1994), p. 27.

In the A-edition of the transcendental deduction, Kant is very clear that associative processes (i.e. empirical conjunction) presuppose a ground of associability *in the subject*, i.e. an *a priori* rule that guides *a posteriori* construction, and cannot be derived from experience itself, but functions as its very condition of possibility.¹¹⁴ The laws of association, or the laws of *reproduction*, as Kant calls them, therefore presuppose the original productivity or spontaneity of understanding:¹¹⁵

[T]he **combination** (*conjunctio*) of a manifold [...] can never come to us through the senses [...] it is an act of the spontaneity of the power of representation [...] all combination [...] is an action of the understanding, which we would designate with the general title **synthesis** in order at the same time to draw attention to the fact that we can represent nothing as combined in the object without having previously combined it ourselves, and that among all representations combination is the only one that is not given through objects but can be executed only by the subject itself, since it is an act of its self-activity.

With regard to this second level of analysis, Helmholtz's appropriation of the causal law has been discussed extensively in secondary literature.¹¹⁶ Helmholtz maintained that the psychological construction of the object or the external world by means of the lawful connection of underdetermined sign-sensations is regulated by, and grounded in, the *a priori* causal structure of understanding. Nonetheless, Helmholtz's interpretation of Kant in this respect has been a topic of debate since the nineteenth century.¹¹⁷ It is clear, however, that the possibility of psychological construction in Helmholtz's theorizing is grounded in a presupposition with regard to the necessary *a priori* structure of understanding, although his precise interpretation of this *a priori* is not always straightforwardly Kantian. Most generally, Helmholtz derives from Kant the necessary *motive* for empirical construction, i.e. the *a priori* rule that "every effect has a cause," as the driving force or constitutive condition of the constructive process.¹¹⁸

¹¹⁴ Kant, *CPR* [A96-97].

¹¹⁵ Kant, *CPR* [B130] [boldface in original text].

¹¹⁶ This will be discussed in chapter 4. The spectre of existing interpretations in this respect can hardly be broadened. While Helmholtz was a self-professed Kantian regarding the law of causality, some argue that his conception of the causal law was rather Humean (e.g. Schlick in Helmholtz, 1977 [1878b]; Erdmann, 1921) or in accordance with Mill (Schiemann, 2009), while others confirm his Kantianism (Heimann, 1974) or state that it is modified Kantianism (Hatfield, 1990; DiSalle, 1993), and still others interpret Helmholtz's use of the causal law as being in line with Fichte (Turner, 1977)

¹¹⁷ See for example Helmholtz (1896 [1855], 1867 [1856/66, III], 1995 [1878b], 1896). For an extensive discussion of Helmholtz's (much disputed) Kantianism with respect to the causal law, see chapter 4.

¹¹⁸ Helmholtz (1896 [1855]), (1867 [1856/66], III), p. 455.

Before we move to the third level of analysis, we should consider yet another aspect of Kant's system, which Fichte was later to establish as the basic starting point of his *System of Knowledge*, namely:¹¹⁹

[P]ure apperception [...] or primitive apperception, [...]. [I]t is that self-consciousness which, because it produces the representation *I think*, must be able to accompany all others and which in all consciousness is one and the same, [and] cannot be accompanied by any further representation.

In other words, for Kant, the possibility of objective representation, as the necessary synthesis of forms of understanding and the matter of receptivity, is in turn grounded in the ultimate postulate of unity, the *I think*, which denotes the necessity of the numerical identity of the Self as related to, but distinguished from, representation. Without the *I think*, the object is unthinkable, as the act of representing would lack a unitary point to relate the manifold to, and distinguish it from the self. Or, in Kant's words:¹²⁰

[T]his thoroughgoing identity of the apperception of a manifold given in intuition contains a synthesis of the representations, and is possible only through the consciousness of this synthesis. For the empirical consciousness that accompanies different representations is by itself dispersed, and without relation to the identity of the subject. [...] Synthetic unity of the manifold of intuitions, as given *a priori*, is thus the ground of the identity of apperception itself, which precedes *a priori* all **my** determinate thinking.

As such, one could say that the *I think* is the ultimate deductive principle from which the entire critical system is derived. This is, at least, what Fichte thought it to be. "Which 'I' is being spoken of here? [Von welchem Ich ist hier die Rede]?" Fichte wonders, and with those words, he launches the transcendental analysis of the I as the be-all and end-all of the critical system.¹²¹

¹¹⁹ Kant, *CPR* [B132]; also see *CPR* [B125-B126]. Also see for example Fichte (1982 [1794, 1797/98]), p. 48-49.

¹²⁰ Kant, *CPR* [B133-B134] [boldface in original text].

¹²¹ Fichte, (1982 [1794, 1797/98]), p. 49; for an analysis of the way in which the Kantian problem of the *I think* constitutes the departure point of Fichte's philosophical system, see among others Neuhouser (1990), Beck (1996), Wood (2000), Frank (2007) and DeBord (2012). Also see chapter 5.

1.3.2.3 Helmholtz and Fichte: The Problem of Differentiation

Kant's pure apperception, according to Fichte, is the ultimate deductive principle from which the entire critical system is derived.¹²² However, he adds, it remains a principle that Kant had "simply asserted," and by no means "proved," although it is, in Kant's conception, the unitary principle from which all critical distinctions are to be deduced.¹²³ "The condition of possibility of all thought is dependent upon another thought," Fichte echoes Kant, namely the "*I think* [...], i.e. I am what thinks in this thinking [Ich bin das denkende in diesem denken]."¹²⁴ The uniting principle, according to Fichte, is the I, thought of as "a thinking [Ein denken]" and not "a thinking thing [ein Denkendes]," or, in short, as a self-relating act.¹²⁵ Fichte's project thus sets out to demonstrate the Kantian postulate of the highest principle of critical philosophy, the *I think*, and in doing so, his project has been described as presenting a metacritical expansion and completion of the Kantian project.¹²⁶ The I that should be able to accompany all representations is conceptualized in Fichte's work as an act of self-positing that relates to itself as activity through 'intellectual intuition', defined as:¹²⁷

[T]he immediate consciousness; that I act [ich handle] [...]. [...] I cannot take a step, move hand or foot, without an intellectual intuition of my self-consciousness in these acts; only so do I know that *I* do it, only so do I distinguish my action [...] from the object of action [...].

In other words, the intellectual intuition denotes the pre-reflective grasp that the subject has of itself as agentive, and as such, it is a constitutive act of self-relation with respect to the possibility of consciousness. Fichte concludes: "Intellectual intuition is the only firm standpoint for all philosophy. From thence we can explain everything in consciousness [...]. Without self-consciousness, there is no consciousness whatsoever."¹²⁸ It is no wonder that Fichte has been credited with being the ultimate philosopher of subjectivity and self-consciousness, but perhaps more importantly, as the philosopher

¹²² Fichte, (1982 [1794, 1797/98]) All quotations of Fichte's work are drawn from English translations (see Bibliography). Original German words as mentioned between brackets are drawn from the corresponding German text (for an overview of the German editions used, see Bibliography).

¹²³ Fichte, (1982 [1794, 1797/98]), p. 51.

¹²⁴ Fichte, (1982 [1794, 1797/98]), p. 48.

¹²⁵ Ibid.

¹²⁶ See for example Zöller (2000).

¹²⁷ Fichte, (1982 [1794, 1797/98]), p. 38.

¹²⁸ Fichte, (1982 [1794, 1797/98]), p. 41.

of *difference*.¹²⁹ Pinkard, for example, summarizes the important message of Fichtean philosophy as follows:¹³⁰

The core insight at the root of Fichte's attempt to complete the Kantian system [...] had to do with what he saw as the basic dichotomy at the root of the Kantian system. [...] Fichte concluded, that dichotomy itself – that core distinction between subjects and objects – was itself subjectively established; it was a normative distinction that subjects themselves institute.

In short, whereas Kant had pointed out the constitutive role of subjective spontaneity in the synthetic activity involved in object construction, Fichte emphasized the subject's self-relating activity as the ground of subject-object difference. In comparison with the Kantian project, this entails a shift in the philosophical scope from the *a priori* formal features of representation to the necessary structure of the *I* that does the representing.

This historically third, metacritical level of analysis of experience resonates with what Heidelberger denoted as Helmholtz's (Fichtean inspired) experimental interactionism, i.e. Helmholtz's insistence on voluntary action as the ultimate constitutive principle of scientific and perceptual objectivity.¹³¹ Heidelberger even goes so far as to claim that Fichte's Ego-doctrine is "the essential key to understanding Helmholtz":¹³²

[T]he inner core of Helmholtz's philosophy of science had its roots in Fichte's philosophy. [...] From Fichte Helmholtz appropriated the view that our consciousness comes to shape its conception of the outer world through the limitations we experience in our practical actions. Only by actively interfering with the world of external objects can we interpret our sensations as due to external causes and thereby distinguish them from the free acts of thinking inside our consciousness.

Contrary to currently ongoing debates on Helmholtz's indebtedness to Kant's critical philosophy, especially with regard to the latter's appropriation of Kant's *a priori* view of causality, the continuity of important aspects of his thought with Fichte's metacritical project has received minimal scholarly attention. However, there are strong arguments in favor of the hypothesis that Helmholtz's adopted certain central elements of Fichte's system as the cornerstone of his answer to *what it is to see*. To overcome this crucial gap

¹²⁹ See for example Neuhouser (1990), Frank (2002, 2004, 2007), Ameriks (2000) and Pinkard (2002).

¹³⁰ Pinkard (2002), p. 108-109; also see Ameriks (2000).

¹³¹ Heidelberger (1993).

¹³² Heidelberger (1993), p. 463.

in Helmholtz interpretation, Heidelberger's analysis will be further expanded in chapter 5.

To summarize, the historical progression from Hume's naturalized theory of the object to Fichte's metacritical account of experience forms the systematic framework, and, as such, the spine of the following analysis of Helmholtz's psychology of the object. More particularly, it not only enables us to relate Helmholtz's theorizing to the historical traditions that have shaped philosophical discussion concerning the object, but moreover, to investigate it from different levels of analysis (empirical construction, constitutive synthesis, and ideal action), which together can be seen as a progressive problematization of the epistemic subject that is the necessary foundation of the ability of objectification. It should be made clear from the very start, however, that this framework is a heuristic tool that will allow us to create some order in the massive historical background from which Helmholtz's theorizing can be read, and to isolate his progressive modes of interrogating the object in experience. As such, the framework here proposed is meant to guide the investigation and glue its consecutive components together into one systematic whole, but not to serve as a restrictive straightjacket. For one thing, Helmholtz's appropriation of philosophical concepts and appeal to philosophical traditions is notoriously idiosyncratic. In the end, Helmholtz was indeed "an independent thinker with his own agenda."¹³³ Hence, it will be clear from the very start of this inquiry, that studying Helmholtz requires not only knowledge of the philosophical traditions and systems that form our point of departure, but more importantly, some willingness to go along with his peculiar interpretation and appropriation of their main insights and concepts. This willingness will allow some insight into the systematic significance of Helmholtz's 'dovetailing' in his perceptual theory, and, of course, it does not preclude a critical assessment of his appropriation of all these different perspectives in the context of theory of the object.

The remainder of this dissertation will be organized as follows. In chapters 3 to 5, the respective levels of analysis of Helmholtz's psychology of the object will be discussed against the background of the historical accounts of the objects as sketched in this section. chapter 3 presents an analysis of Helmholtz's empiricism, by investigating its continuity with Hume's and Mill's psychological accounts of the object. A large part of this chapter, however, is dedicated to empiricism's inherent inability to account for the subject or self. Subsequently, we proceed to Helmholtz's Kantianism in chapter 4, and examine the way in which Helmholtz's adoption of a critical level of analysis can be said

¹³³ Finger & Wade (2002a), p. 136.

to be necessitated by the problems of empiricist psychology. Finally, we go into the metacritical dimension of Helmholtz's thought, linked historically to Fichte's Ego-doctrine. In this last chapter, Helmholtz's emphasis on the constitutive role of voluntary action in perception is interpreted against the background of Fichte's analysis of the necessary self-reflexive structure of the subject as a constitutive condition for experience. First and foremost, however, it is important to get a firm grasp of the foundations and structure of our central problem: the psychological problem of the object. To that end, the next chapter will present an in-depth analysis of the physiological and philosophical arguments that prompted Helmholtz to consider perception as an irreducible psychological process.

Chapter 2

Helmholtz's Physiological Epistemology and the Genesis of the Psychological Problem of the Object

The inaccuracies and imperfections of the eye [...] appear insignificant in comparison with the incongruities which we have met in the field of sensation.

One might almost believe that Nature had here contradicted herself on purpose, in order to destroy any dream of a pre-existing harmony between the outer and the inner world.

- Hermann von Helmholtz (1995 [1868]), p. 173.

2.1 Introduction

As explained in the introductory chapter, a determining factor in the genesis of Helmholtz's psychological perspective on perception pertained to the assumption of a radical gap or discontinuity between the physical/physiological structure of the sensory apparatus and mental representation. In order to get a firm grasp of the foundation of Helmholtz's psychology, we therefore have to consider the arguments he invoked in favour of this epistemological fissure, and against what he denoted (in Leibnizian terms) as a *pre-established harmony* between subject and object.

First, this involves a consideration of Helmholtz's adoption and expansion of his teacher Johannes Müller's epochal *Law of Specific Nerve Energies* [Gesetz der Spezifischen Sinnesenergien], a physiological law that posits a fundamental incongruity between internal states of excitation and external objects and affairs. On the other hand, it will

be argued that Helmholtz's anti-metaphysical attitude played a crucial role in determining his psychological view on perceptual objectification.

In order to gain insight into the physiological and philosophical background of Helmholtz's psychological perspective, this chapter will subsequently address the following topics:

- (1) Helmholtz's relation to his teacher in physiology Johannes Müller (section 2.2), and more particularly (i) his criticism of Müller's vitalism (section 2.3), and (ii) his adoption and expansion of Müller's Law of Specific Nerve energies (section 2.4 and 2.5).
- (2) The epistemological consequences of Müller's Law for the theory of perception in general, and Helmholtz's conception of the subject-object relation in particular (section 2.6 and 2.7).
- (3) Helmholtz's philosophical (anti-metaphysical) arguments in favor of the autonomy of psychology vis-à-vis physics and physiology (section 2.8).

2.2 Hermann von Helmholtz and Johannes Peter Müller

As early as 1852, Helmholtz refers to Johannes Peter Müller, his teacher of physiology in Berlin and supervisor of his doctoral dissertation, as one of the “most astute thinkers and accurate observers” among the new generation of physiologists.¹³⁴ When Helmholtz became his pupil at the Friedrich-Wilhelm Institute in 1838, Müller (1801-1858) was a leading anatomist and physiologist in Europe.¹³⁵ After studying medicine in the Friedrich-Wilhelm Institute in Bonn – “a bastion of *Naturphilosophie* or Romantic Science” according to Finger and Wade – Müller, only twenty three years old at the time, accepted a position as a *Privatdocent* in Bonn. Here he would later be appointed professor, after which he accepted the chair in physiology and anatomy in Berlin in 1833.¹³⁶ Although he performed some experiments during his lifetime, he never valued experimental science as high as he did theoretical physiology.¹³⁷ Müller's research

¹³⁴ Helmholtz (1883 [1852]), p. 593 [my translation]; also see Holmes (1994).

¹³⁵ For a recent analysis of the significance of Johannes Müller on the development of nineteenth-century physiology, see Otis (2007).

¹³⁶ Finger & Wade (2002a), p. 138; Otis (2007).

¹³⁷ In 1826 (p. xviii, xix), Müller called his perspective a “physiology according to the philosophical approach to nature.” Müller was more interested in formulating general laws and theoretical systems than he was in

interests were remarkably broad, pertaining to pretty much every study field that was related to organic life, and his scientific interest remained entangled with his inclinations toward romantic *Naturphilosophie* during his entire career.¹³⁸

Helmholtz's teacher became especially famous for his work on nervous and sensory systems, and for his much praised *Elements of Physiology* [Handbuch der Physiologie des Menschen] (1833/40). In the latter work, Müller gives a mature statement of his highly influential *Law of Specific Nerve Energies* (LoSNE), although he had already sketched the general outlines of his physiological approach to human vision as early as 1826 (at the age of 25), in his *On the Comparative Physiology of Vision in Men and Animals* [Zur vergleichenden Physiologie des Gesichtssinns]. Most generally, Müller's LoSNE established the fundamentally underdetermined nature of sensory stimulation with respect to its (internal or external) origin. As will be discussed in sections 2.6 and 2.7, the impact of LoSNE on Helmholtz's perception theory and epistemological position can hardly be overestimated. Unfortunately, Müller was also known for his poor mental health, and after at least five nervous breakdowns, the brilliant scientist deceased unexpectedly in his Berlin home at the age of fifty-five, in unknown circumstances.¹³⁹ His legacy was continued in the work of Helmholtz, however, who went so far as to state that Müller's LoSNE was "a scientific achievement [...] equal to that of the discovery of the law of gravitation."¹⁴⁰

Before we can move on to Müller's law, however, it is important that the reader gets a firm grasp of the quite complex intellectual relationship Helmholtz entertained with his teacher. Helmholtz's treatment of the problem of perception was determined just as much by his adherence to Müller's thought, as it was by his opposition to the vitalist and nativist tendencies in the latter's physiological work. To be more precise, Helmholtz not only departed from his teacher's views by defending a *reductionist physiology*, he also differed from the latter by defending a *non-reductionist psychology*. On the one hand, Helmholtz's anti-vitalism is telling with respect to his stance as a physiologist, while on

experimental work (see for example Otis, 2007). As Helmholtz testifies in his *Autobiographical Sketch* (1995 [1891]), his teacher remained somewhat ambivalent towards the experimental method, although he successfully stimulated his students in this new direction. As will be made more clear later, the 'empirical evidence' that Müller invokes in support of his Law of Specific Nerve Energies, is either borrowed from other physiologists, or based upon quiet introspection and self-experimentation.

¹³⁸ Finger & Wade (2002a); Otis (2007); Helmholtz (1995 [1891]).

¹³⁹ Müller's students were all shocked by the death of their teacher, and speculated quite a bit on its most likely cause. Most of them seemed to suspect an unnatural cause, and hypothesized that their teacher, notoriously depressed and hooked on opium at the time of his death, had taken his own life. An intriguing account of Müller's mysterious death, as well as the way in which it affected his students, is given in the afterword of Otis (2007).

¹⁴⁰ Helmholtz (1995 [1877a]), p. 320.

the other, his lifelong crusade against nativism defined his psychological position. In discussing Helmholtz's theory of science, it is of utmost importance to differentiate between his physiological and his psychological position, as failing to do so can be (and has been) a source of serious misunderstanding with regard to his philosophy of science. As will become clear, both theoretical positions were motivated by his anti-metaphysical attitude, and they should be understood against that background.

2.3 Helmholtz's Physiological Reductionism: Anti-Vitalism

*A metaphysical conclusion is either a false conclusion or
a concealed experimental conclusion*

- Helmholtz (1995 [1877]), p. 326

When Helmholtz arrived at the Friedrich-Wilhelm Institute in Berlin to study medicine, he soon felt that his chosen discipline was facing a crisis with respect to the norms of scientific practice and scientific reasoning, and that it strove to reinvent itself. More particularly, the deductive method was gradually discredited, in favour of inductive inquiry and experimental research. Correlative with this shift, the metaphysical explanation of biological processes gave way to physical analysis and reduction. A definite fissure arose between the older generation of theoretical or intellectual physiologists and the newer generation that was to instigate 'the laboratory revolution' in medicine.

Helmholtz describes the medical discipline as he found it upon his arrival in Berlin as unfolding from central dogma's –rationally construed fallible hypotheses, that were either presumed to be 'guaranteed by authority', or 'wished' to be true – from which the entire body of medical knowledge was deduced.¹⁴¹ Medical science, in short, was a predominantly intellectual affair, and as such, the enthusiasm with which theoretical systems were produced, contrasted sharply with the common disregard for experimental practice and inductive science. In a lecture from 1877, at the age of 56, Helmholtz looks back at the conditions under which he himself once studied medicine at the Friedrich-Wilhelm Institute:¹⁴²

¹⁴¹ Helmholtz (1995 [1877a]).

¹⁴² Helmholtz (1995 [1877a]), p. 319.

The medical education of that time was based mainly on the study of books; there were still lectures, which were restricted to mere dictation; [...]; there were no physiological and physical laboratories. [...] Microscopic demonstrations were isolated and infrequent in the lectures. Microscopic instruments were costly and scarce. [...] Any of my fellow-students who wished to make experiments had to do so at the cost of his pocket-money. [...] We had, it is true, an almost uncultivated field before us, in which almost every stroke of the spade might produce remunerative results.

Helmholtz's description of the state of medical science resonates with the idea of *romantic science* or *Naturphilosophie* – as prototypically represented in Goethe's work – i.e. a science that was very close to philosophy and art, and aimed at unraveling the secrets of nature and at building all-encompassing deductive systems.¹⁴³ As Knight describes, “the real division was between the realm of science, governed by reason, and that of practice, or rule of thumb.”¹⁴⁴

Helmholtz considered the deductive method in the science of medicine to be “a great hindrance to progress,” and the plea for a factually [Tatsächlich] based science remained the *leitmotiv* in his scientific perspective during his entire career.¹⁴⁵ With respect to the development and popularization of the experimental method in science, Helmholtz is to be credited with more than one ‘stroke of a spade’. He actively sought to establish and improve experimental practice, by setting up carefully controlled experiments, and introducing a number of new instruments and methods that allowed for the objective measurement of physiological states and physical structures.¹⁴⁶ Moreover, through

¹⁴³ Finger & Wade (2002a); on romantic science, also see for example Meulders (2010), Knight (1990), and Broman (1996).

¹⁴⁴ Knight (1990), p. 14; also see Broman (1996). For example, Helmholtz (1995 [1877a], p. 319) testifies that an “aged and learned professor,” who divided physiology in an “intellectual part, and the lower experimental part” gave up on him after he had told the latter that “he considered experiments to be the true basis of science.”

¹⁴⁵ Helmholtz (1995 [1877a]), p. 319.

¹⁴⁶ Helmholtz (1883 [1851]). In a letter to his father, Helmholtz describes his discovery of the ophthalmoscope – an instrument that in a somewhat modified and perfected version still plays an important role in the physical investigation of the eye up to this day – as follows: “It is [...] a combination of glasses, by means of which it is possible to illuminate the dark background of the eye, through the pupil, [...] and obtain a view of all the elements of the retina at once [...]. Till now a whole series of most important eye-diseases, [...] have been terra incognita, because the changes in the eye were practically unknown [...]. My discovery makes the minute investigation of the internal structures of the eye a possibility” (as quoted in Koenigsberger (1906 [1902/1903], p. 74). In his *Autobiographical Sketch*, Helmholtz describes the profound influence his invention had on the development of his career, stating for example that from that time on he “met with the most willing recognition [...] on the part of the authorities and of [...] colleagues” (Helmholtz, 1995 [1891], p. 387).

numerous popular lectures, Helmholtz actively sought to propagate a new scientific worldview.

The general academic climate Helmholtz describes in his 1877 and 1891 lectures was struggling between metaphysical reasoning and physical experimentation, and Helmholtz's teacher, Johannes Müller, by all means represented a transitional figure.¹⁴⁷ As already mentioned, Müller, who's work covered a staggering variety of research topics, became especially famous for his work on sensory and nervous systems in animals (mostly frogs) and studies in comparative anatomy.¹⁴⁸ When it came to his philosophy of science, however, Müller remained a man who "struggled between the older – essentially the metaphysical – view and the naturalistic one [...]" as Helmholtz describes.¹⁴⁹

On the one hand, Müller's medical education in Bonn, at the time a celebrated intellectual center of romantic science, had been completely determined by this romantic ideal, with a focus on reason and observation, and weary of experimental practice.¹⁵⁰ Although Müller never succeeded in shaking off the romantic and rationalist tendencies in his thought, most scholars agree that in the course of his lifetime there was a gradual shift in his philosophical position, and that he increasingly endorsed a more moderate position towards inductivism and experimentalism.¹⁵¹ It is likely that this happened at least partially under the influence of Karl Asmund Rudolphi, with whom Müller studied after obtaining his degree in Bonn, and who tempered Müller's metaphysical inclinations.¹⁵² Müller became steadily convinced of the value of observation and experiment, and the principles of inductive science in general, and although he can hardly be called an experimental physiologist – for one thing, Müller never had a laboratory – he actively stimulated his students in this direction.¹⁵³

Although he himself still stood with one foot in the old (metaphysical) tradition, Müller deserves to be called a 'catalyst' with respect to the development of

For some interesting accounts of Helmholtz's lifelong concern with the significance of exact measurement, see Olesko & Holmes (1993); Finger & Wade (2001, 2002a, 2002b); Darrigol (2003).

¹⁴⁷ Lenoir (1997); Holmes (1994); Robinson (1986); Finger & Wade (2002a).

¹⁴⁸ Finger & Wade (2002a); Otis (2007).

¹⁴⁹ Helmholtz (1995 [1891]), p. 385.

¹⁵⁰ In the introduction to his 1826 work on comparative anatomy, Müller is a quite outspoken sceptic with respect to experimental science. Furthermore, his romantic view of physiology transpired in his lifelong insistence on the importance of a "unified science of life" and a "synthetic philosophical understanding of the nature of life," and the construction of a "sensible [verständige] physiology" (Lenoir, 1997, p. 104).

¹⁵¹ See among others Hagner & Währig-Schmidt (1992), Holmes (1994), Meulders (2010) and Finger & Wade (2002a).

¹⁵² Finger & Wade (2002a); Meulders (2010).

¹⁵³ Otis (2007).

experimental science in nineteenth-century Germany, guiding his pupils towards innovative lines of physiological research, and thus setting the stage for modern physiology.¹⁵⁴ Some of his most notable students, i.e. Hermann von Helmholtz, Emil du Bois-Reymond, Ernst Brücke, later played a very important role in spreading and propagating the empiricist and experimental method as the basis of natural science in Germany, for example through their instauration of the Berlin Physical Society [Berliner Physikalische Gesellschaft] (see below). Müller's students allegedly "did science anywhere and everywhere they could: in tiny rooms [...], in the window nooks of the Anatomical Museum, [...] in a run-down guest house, [...]"¹⁵⁵ In one way or another, Müller's qualities as a mentor and his open mindedness towards investigative topics that did not stroke with or even opposed his own research interests, has given rise to a generation of scientists who have all left an important mark on the history of physiology and medicine.¹⁵⁶ "It may be," Helmholtz suggested, "that his [Müller's] influence over his students was the greater because he still so struggled."¹⁵⁷

Notwithstanding the lifelong loyalty these students exhibited towards their teacher, they have also been described as rebellious, not in the least for actively opposing Müller's vitalism, i.e. his appeal to the metaphysical concept of life force [Lebenskraft] in his physiological work.¹⁵⁸ Emil du Bois-Reymond, Brücke and Helmholtz especially, spend a lot of effort clearing the way for and defining the aim and scope of a physical

¹⁵⁴ Lenoir (1997), Finger & Wade (2002a), Otis (2007), Cassedy (2008).

¹⁵⁵ Otis (2007), p. XI.

¹⁵⁶ To give some examples: Jakob Henle, one of Müller's first students, is commonly credited with anticipating Louis Pasteur's microbe theory; Theodor Schwann famously developed the cell theory of the living organism; Ernst Haeckel, in his turn, became famous for the idea that ontogenetic development recapitulates phylogenetic evolution. Müller's students further included Rudolf Virchow and Robert Remak, whose work has also been of utmost importance for the development of medical science. For a complete overview of the accomplishments of Müller's circle, see Otis (2007).

¹⁵⁷ Helmholtz (1995 [1891]), p. 385.

¹⁵⁸ Lenoir (1982, 1997). See for example Müller (1843 [1833/40]), p. 27-32: "[T]here is in living organic matter a principle constantly in action, the operations of which are in accordance with a rational plan [...] The organic force, which resides in the whole, and on which the existence of each part depends, has [...] the property of generating from organic matter the individual organs necessary for the whole. [...] [T]he harmonious action of the essential parts of the individual subsists only by the influence of a force, the operation of which is extended to all parts of the body, which does not depend on any single organ [...] The organising principle, [...] according to an eternal law creates the different essential organs of the body, and animates them [...]. This principle, thus acting conformably to design [...] is also manifested in the phenomena of instinct. [...] There is great beauty and truth in the saying of Cuvier, that animals acting from instinct are, as it were, possessed by an innate idea, by a dream. But that which excites this dream can be nothing else than the organising principle, the 'ultimate cause' of being." Also see Müller (1843 [1833/40]), p. 787-790. On Müller's vitalism see for example Koenigsberger (1902/1903), Hagner & Währig-Schmidt (1992), Finger and Wade (2002a), and Meulders (2010).

physiology properly so called: an account of the biological processes taking place in the living organism that proceeds from physico-chemical modes of explanation and is emptied of metaphysical concepts.¹⁵⁹ In his *Autobiographical Sketch*, Helmholtz recalls his aspiration as a young man, to free the life sciences of this mystic ‘force’ presumed to be at the basis of all organic life, at least since the time of Aristotle.¹⁶⁰

Young people are ready at once to attack the deepest problems, and thus I attacked the perplexing question of the vital force. Most physiologists had at that time adopted G.E. Stahl’s way out of the difficulty, that while it is the physical and chemical forces of the organs and substances of the living body which act on it, there is an indwelling vital soul or vital force which could bind and loose the activity of these forces; that after death the free action of these forces produces decomposition, while during life their action is continually being controlled by the soul of life. I had a misgiving that there was something against nature in this explanation [...].

Although Helmholtz opposed Georg Ernst Stahl’s doctrine in particular, whose vitalism took the form of the assumption of a *vis vitalis* as the underlying teleological principle for all biological life (and death) processes, it is clear that his anti-vitalism likewise flies in the face of Müller’s assertions regarding the irreducibility of vital processes to the physical level.¹⁶¹

After finishing his studies in medicine, Helmholtz occupied himself with designing experiments and developing new theoretical frameworks that aimed at providing experimental proof that both animate and inanimate matter could be analyzed in terms of physico-chemical force transformations, and that hence, the concept of life force was utterly redundant. During a time span of roughly a decade, Helmholtz conducted research on fermentation and putrefaction, muscular contraction and heat production in frogs, the velocity of the nerve impulse, and finished his paper on the *Conservation of Force*. In the course of this research, Helmholtz’s experimental abilities thrived. For one thing, he developed remarkably refined instruments like the myograph, to measure the velocity of nerve impulses, and other devices that would allow him to objectively measure the chemical and electrical transformations taking place in the muscle during contraction.¹⁶² Furthermore, he carefully staged his experiments so as to exclude unknown variables, and repeated his experiments to correct for fluctuations in

¹⁵⁹ See for example Brücke (1885), p. 7 and Emil du Bois-Reymond (1912).

¹⁶⁰ Helmholtz (1995 [1891]), p. 385; For his criticism of Stahl, also see Helmholtz (1995 [1869, 1877a]).

¹⁶¹ Helmholtz (1995 [1877a]), p. 317.

¹⁶² On Helmholtz’s invention of the myograph to measure the velocity of nerve impulse, see for example Koenigsberger (1902/03), Olesko & Holmes (1993), Finger & Wade (2002a) and Meulders (2010).

individual research results.¹⁶³ In short, during this period, which preceded his work in the field of optics, Helmholtz was credited as one of “the most innovative experimentalists of his day.”¹⁶⁴

More importantly, however, the research results obtained gradually built up to form a convincing body of evidence against the vitalist hypothesis. Firstly, Helmholtz's 1843 research on putrefaction proved that this process was caused by purely chemical processes (caused by the breakdown of proteins and glutes), and not by the disappearance of life force from the organism, like Stahl and Müller had presumed.¹⁶⁵ Secondly, in the course of the second half of the 1840s, Helmholtz proved that metabolic changes and heat production in the muscle during contraction could likewise be ascribed to physico-chemical processes, and that hence, there was no need to invoke the concept of life force to account for both.¹⁶⁶ Furthermore, the young scientist was able to disprove Müller's hypothesis of the immeasurableness of the velocity of nerve impulses.¹⁶⁷ Through his myographic experiments on frogs, he not only established that nerve impulse is in fact measurable, but more importantly, that the velocity of nerve transmission is remarkably slow (some 26 meters per second). This experimental evidence refuted the hypothesis of an immeasurable, indwelling life force, and instead, pointed out that the “nerve impulse emerged as neither metaphysical nor mysterious, but as yet another physico-chemical event.”¹⁶⁸ Helmholtz's work culminated in his 1847 paper on the *Conservation of Force*, in which he gave a mathematical exposition of the conservation principle, stating that “the quantity of force which can be brought into action in the whole of Nature is unchangeable, and can neither be increased nor diminished.”¹⁶⁹ The author presented the principle as a ‘theoretical, practical and

¹⁶³ Koenigsberger (1902/1903); Oleskko & Holmes (1993); Finger & Wade (2001, 2002a, 2002b); Meulders (2010).

¹⁶⁴ Finger & Wade (2002a), p. 137.

¹⁶⁵ Koenigsberger (1906 [1902/1903]), p. 25. Helmholtz (1995 [1877a], p. 317) describes the vitalist theory of putrefaction as follows: “The soul of life [i.e. Stahl's *vis vitalis*] governs the body, and only acts by means of the physico-chemical forces of the substances assimilated. But it has the power to bind and to loosen these forces, to allow them full play or to restrain them. After death the restrained forces become free, and evoke putrefaction or decomposition.”

¹⁶⁶ For an overview of the papers Helmholtz wrote on this topic, see Koenigsberger (1902/1903).

¹⁶⁷ See Koenigsberger (1902/1903); Meulders (2010).

¹⁶⁸ Finger & Wade (2002a), p. 152. Interestingly, Helmholtz's research results seemed to have troubled his romantic father, who wrote the following to his son: “As regards your work, the results at first appeared to me surprising, since I regard the idea and its bodily expression not as successive, but as simultaneous, a single living act, that only becomes bodily and mental on reflection: and I could as little reconcile myself to your view, as I could admit that a star that had disappeared in Abraham's time should still be visible” (Ferdinand Helmholtz, as quoted in Koenigsberger, 1906 [1902/1903], p. 67).

¹⁶⁹ Helmholtz (1995 [1862/63]), p. 98.

heuristic' tool, enabling an understanding of both organic and inorganic matter in terms of mechanical force transformations.¹⁷⁰ Besides rendering the hypothesis of life force redundant, the principle likewise refuted the possibility of a *perpetuum mobile*, i.e. “a machine which was to work continuously without the aid of any external driving force,” as it implies that “force cannot be produced from nothing, something must be consumed.”¹⁷¹ The programmatic significance of Helmholtz's work is not easily overestimated. Basically, it inserted the human body into the mechanical worldview, and as such, put it within the purview of Newtonian physics, and out of the sphere of speculative metaphysics.

It is clear from Helmholtz's opposition to vitalism that he defended mechanical reductionism with respect to the scientific study of the nature and functioning of the human body, and as such, he was one of the founders of physical physiology. Thanks to his epoch-making formulation of the conservation principle, Helmholtz became a renowned member of the (still extant) Berlin Physical Society (BPS), founded in 1845 by Brücke, du Bois-Reymond and Ludwig. The general program endorsed by this association was based in the alleged oath of its members to do everything possible to scientifically demonstrate that there are “no other forces than the common physical-chemical ones [...] within the organism.”¹⁷²

Helmholtz's membership of the BPS and his strong anti-vitalist attitude, have led some to conclude that he endorsed a full-fledged materialism or physicalism.¹⁷³ In its most extreme formulation, Helmholtz's work in general is described as radically materialist, aiming at “the reduction of both the vital function and of sensory perception to material processes.”¹⁷⁴ Although it can hardly be denied that Helmholtz's physically based scientific physiology entails a form of reductionism, i.e. a mode of explanation that reduces physiological processes to physico-chemical interactions, the reception of his work as a defense of materialism is flawed for a number of reasons.

Most importantly, Helmholtz's anti-metaphysical stance led him to explicitly reject *both* absolute idealism and materialism. In a letter to his father, he explicitly distanced himself from the ‘vulgar’ materialism of Karl Vogt and Jacob Moleschott, claiming that their works came down to nothing more than ‘trivial tirades’, not representative for the general views of the scientific community.¹⁷⁵ In a lecture later on in his career,

¹⁷⁰ Helmholtz (1889 [1847]), p. 53.

¹⁷¹ *Ibid.* p. 125-126.

¹⁷² Emil du Bois-Reymond, in a letter from 1841 to Ludwig, as quoted by Bernfeld (1944), p. 348.

¹⁷³ See among others Hergenhahn (2009), p. 237; Bowler & Morus (2005), p. 177; Mayr (1997), p. 6.

¹⁷⁴ Wise (1983), p. 13.

¹⁷⁵ Hermann von Helmholtz, as quoted in Koenigsberger (1906 [1902/1903]), p. 160.

Helmholtz warns his audience that “materialism is a metaphysical hypothesis” and as such, a dogma, that “can hence hinder the progress of science and lead to [...] intolerance, just like any other dogma would.”¹⁷⁶ Helmholtz furthermore adds that whereas his “generation has had to suffer under the tyranny of spiritualistic metaphysics,” the “newer generation will probably have to guard against that of the materialistic hypotheses.”¹⁷⁷ In short, Helmholtz was a principled opponent of all sorts of metaphysical explanation, including materialism.

Additionally, Helmholtz's anti-metaphysical perspective not only led him to assert a reductionist position in physiology, but also to emphasize the non-reducible nature of the mental to the physical-physiological realm (see section 2.8). More specifically, Helmholtz's psychology starts from a rejection of nativism, or what he called naturalism with regard to the mental in general, and from the non-reducible nature of the mental processes involved in perception, in particular.¹⁷⁸ This is why Drobisch, among others, actually considered Helmholtz's psychological project as an attempt to refute *materialism* with regard to the mind.¹⁷⁹ As Hatfield observes, Helmholtz “considered psychology to provide a distinct type of explanation, with its own evidential basis independent of physiology.”¹⁸⁰ The interpretation of Helmholtz's work as a defense of metaphysical materialism is therefore founded in a misunderstanding of his physiological reductionism, as well as a disregard for his insistence on the autonomy of psychological investigation.

In this respect, it is also important to make clear that the BPS arose as a consequence of the joint efforts of its members to actively exterminate metaphysical concepts from physiological explanation, in favor of what one might call methodological reductionism or naturalism with regard to the study of organic processes.¹⁸¹ Their pledge, however, pertained to a *method* of scientific explanation (metaphysical versus natural), whereas the metaphysical question regarding the essence of life (or the organic) was put aside. As such, the society did not endorse a metaphysical position per se, but was exclusively concerned with the appropriate method to be used in physiological science. Hence, Helmholtz's membership does not allow for any conclusions with respect to his *psychological* position, or with his take on what the mind is, or how it should be studied.

¹⁷⁶ Helmholtz (1896 [1877a]), p. 187. For unknown reasons, this particular passage is omitted in Cahan's 1995 translation of the relevant lecture.

¹⁷⁷ Helmholtz (1995 [1877a]), p. 323.

¹⁷⁸ See Helmholtz (1867 [1856/1866], III).

¹⁷⁹ Drobisch in Lange (1881), p. 222. Helmholtz's insistence on the autonomy of psychology will be discussed in detail in the following chapters.

¹⁸⁰ Hatfield (1990), p. 182.

¹⁸¹ For a full discussion of the term ‘methodological naturalism’, see chapter 3.

As already mentioned, Johannes Müller, notwithstanding his vitalism, did influence Helmholtz's theory of perception to a significant degree; an indebtedness that affected the latter's epistemological stance in its core. In what follows, this indebtedness and the relevant sections of Müller's work in this respect will be discussed, starting with a general overview of the philosophical and physiological tradition that culminated in Müller's formulation of LoSNE.

2.4 Goethe, Purkinje, Müller and the Primacy of Subjective Perception.

Müller's work on sense perception, as discussed in detail in the next section, was the culmination point of a philosophical and physiological tradition that has been referred to by Crary as the tradition of *subjective vision*.¹⁸² More particularly, all the authors discussed below, (i) were fascinated with subjective phenomena of perception, i.e. perceptual phenomena without an external correlate, (ii) used their respective studies on that topic as counterevidence for mere physical theories of perception, and (iii) argued for a paradigm shift in the study of perception from the inquiry into external conditions, to that of internal (physiological and psychological) determining factors.¹⁸³ For the purposes of this investigation, a selective discussion of this tradition will suffice, as it contains the seeds of what Helmholtz was later to call his *physiological epistemology*, which took the specific reactivity of the sensory apparatus as the explanatory foundation of human perception.¹⁸⁴

In his 1826 work on comparative physiology, Müller placed himself in the tradition of Goethe and the Czech physiologist Jan Evangelista Purkinje, the son-in-law of the former's teacher in Berlin, Karl Asmund Rudolphi.¹⁸⁵ More particularly, Müller mentions

¹⁸² Crary (1992). In this respect, also see for example Lang (1987) and Wade & Brožek (2001).

¹⁸³ Lang (1987); Crary (1992). Müller (1843 [1833/40], p. 740-744) refers for example to the following phenomena as examples of subjective vision: appearances produced by pressure on the retina (the so-called pressure phosphene), luminous appearances produced by the arterial pulse, appearances produced in the eye by electricity, spontaneous appearances of light in the darkened eye, and so on. This particular section of his opus magnum is replete with references to Purkinje.

¹⁸⁴ Helmholtz (1995 [1892]), p. 409.

¹⁸⁵ Finger & Wade (2002a); Müller places himself in the tradition of Goethe and Purkinje in 1826, p. XIX and 1843 [1833/40], p. 712, among others.

Goethe's 1810 *Theory of Colors* [Zur Farbenlehre] and Purkinje's 1819 doctoral dissertation *Observations and Experiments on the Physiology of the Sense, Contributions to the Knowledge of Vision in its Subjective Aspect* [Beobachtungen und Versuche zur Physiologie der Sinne. Beiträge zur Kenntniss des Sehens in subjectiver Hinsicht], which was translated into English only recently, as intellectual precursors to his own work on the nature of human sense perception.¹⁸⁶ What united these three authors especially, was their emphasis on the insufficiency or inadequacy of a one-sided focus on the physical properties of light and light refraction, with regard to the question of *what it is to perceive*.¹⁸⁷ In support of their view, all three pointed to the fact that "the body itself produces phenomena that have no external correlate," i.e. the so-called subjective phenomena of perception, and that hence, these internal conditions are foundational with respect to the study of perception.¹⁸⁸

Goethe, Purkinje and Müller all identified Newton's *Optics* as their main antagonist. As Wade & Brožek noted, Newton did accept a subjective dimension in human vision, but differed from the authors here discussed, by subordinating these subjective determining factors to the 'physics of light'.¹⁸⁹ Goethe was especially fierce in his radical, and misguided, as Helmholtz and others would later point out, denunciation of Newton's theory of color, and his physical approach to vision in general.¹⁹⁰ In the *Preface* to the first edition of his *Theory of Colors*, the romantic philosopher did not hesitate to ventilate his discontent with the "intolerable arrogance" of the Newtonian school, and goes on to present his own work as an attempt to overcome the 'old castle' of

¹⁸⁶ Müller allegedly had one, rather disappointing, personal meeting with Goethe (who was in his late seventies at the time), but the latter did not show much interest in the physiologist's work. After a failed attempt to meet Goethe in 1826, Müller succeeded to meet the romantic poet two years later in Weimar. Based on Müller's account of this encounter and on the lack of any account of it on the part of Goethe's chronicler, Meulders (2010) concludes that it must have been a rather disappointing meeting, perhaps due to mistrust or vanity on one or both sides. Goethe was however acquainted with, and impressed by the works of Purkinje, and would even have been disappointed that the Czech physiologist did not mention him as a source of inspiration in his above mentioned doctoral dissertation (Wade & Brožek, 2001). Also see Burwick (1986).

¹⁸⁷ *Ibid.*, p. 2. Already in Goethe's (and in Schopenhauer's) theory of physiological colours, one could easily find the seeds of what would later come to be known as physiological neo-Kantianism, i.e. a reinterpretation of the Kantian *a priori* of experience as referring to the subject's physiological organization (see Schnädelbach, 1984; Crary, 1992; Crone, 1997). See section 2.7.

¹⁸⁸ Crary (1992), p. 71. Subjective phenomena of vision are described in Müller (1843 [1833/40]), p. 740–744, partially on the basis of Purkinje's works.

¹⁸⁹ Wade & Brožek (2001), p. 2.

¹⁹⁰ The main controversy pertained to the nature of white light, which was 'pure' according to Goethe, and composite according to Newton (and the later Helmholtz). However, the physical details of Goethe's and Newton's colour theories and of their controversy are beyond the scope of this discussion. We focus more generally on the paradigm of subjective vision.

Newtonianism.¹⁹¹ Although Goethe's *Farbenlehre* was received by many as an arrogant and scientifically inadequate work, its underlying rationale inspired a whole generation of thinkers.¹⁹² In the first chapter of his 1810 dissertation, Goethe introduced the concept of *physiological colors*, defined as phenomena of color sensation that lack an external correlate, and therefore "belong altogether [...] to the subject."¹⁹³ As an example hereof, Goethe's describes the after-image (also invoked by both Müller and Purkinje as examples of subjective vision):¹⁹⁴

Let a room be made as dark as possible; let there be a circular opening in the window-shutter about three inches in diameter, which may be closed or not at pleasure. [...] [L]et the spectator from some little distance fix his eyes on the bright circle thus admitted. The hole being then closed, let him look towards the darkest part of the room; a circular image will now be seen to float before him.

These physiological colors, according to Goethe, are not aberrations or pathological phenomena, but quite the contrary, they point out the foundational dynamics of perception itself.¹⁹⁵

In contrast to Goethe's 1810 bold endeavor to refute Newton's *Optics* altogether, Müller and Purkinje, who both acknowledged the influence of the latter on their work, stressed the complementary nature of their research on the subjective determinants of perception with physical investigation. Purkinje, for example, put forward his inquiry as a necessary completion of what he calls the 'objective sciences'. He added that with respect to the problem of perception, both sciences, subjective and objective, are equally important, although he regretted that the 'subjective' sphere had been neglected for so long.¹⁹⁶ Unjustly so, according to the Czech physiologist. He defined subjective perceptual phenomena as "sensations that do not correspond to anything outside the body," and "illusion, phantoms, or appearance with no corresponding

¹⁹¹ Goethe (1840 [1810]), p. xxi, xxv: "In the second part, we examine the Newtonian theory; a theory which by its ascendancy and consideration has hitherto impeded a free inquiry into the phenomena of colours. We combat that hypothesis, for although it is no longer found available, it still retains a traditional authority in the world. Its real relations to its subject will require to be plainly pointed out; the old errors must be cleared away, if the theory of colours is not still to remain in the rear of so many other better investigated departments of natural science." Goethe's rejection of Newton's insights on white light and colours was fundamentally flawed, as Helmholtz (1995 [1853], 1995 [1892]), among others, would later point out. For an extensive discussion of the Newton-Goethe controversy on the nature of colour vision, see Sepper (1988).

¹⁹² Not only Müller and Purkinje can be placed in the tradition of Goethe, but Schopenhauer too referred to Goethe's *Farbenlehre* as the theoretical basis of his own work *Über das Sehn und die Farben* (1986 [1816]).

¹⁹³ Goethe (1840 [1810]).

¹⁹⁴ Goethe (1840 [1810]), p. 16; also see Purkinje in Wade & Brožek (2001), p. 83-86; Müller (1826).

¹⁹⁵ Goethe (1840 [1810]), p. 2.

¹⁹⁶ Purkinje (1819) in Wade & Brožek (2001), p. 64.

reality” that, as such, involve “only the sensory organs,” and according to him, it is only by studying these that one can gain insight into the basic dynamics of the perceptual process, i.e. physiological reactivity and psychological determining factors.¹⁹⁷ Purkinje went to great lengths to describe his – sometimes drug-induced – subjective visual experiences, for example, through peculiar self-drawn images (see figure 1). Much like Müller, the Czech physiologist based his research on careful introspection, self-experimentation and self-observation; or on the *heautognostic* method, as he would call it.¹⁹⁸

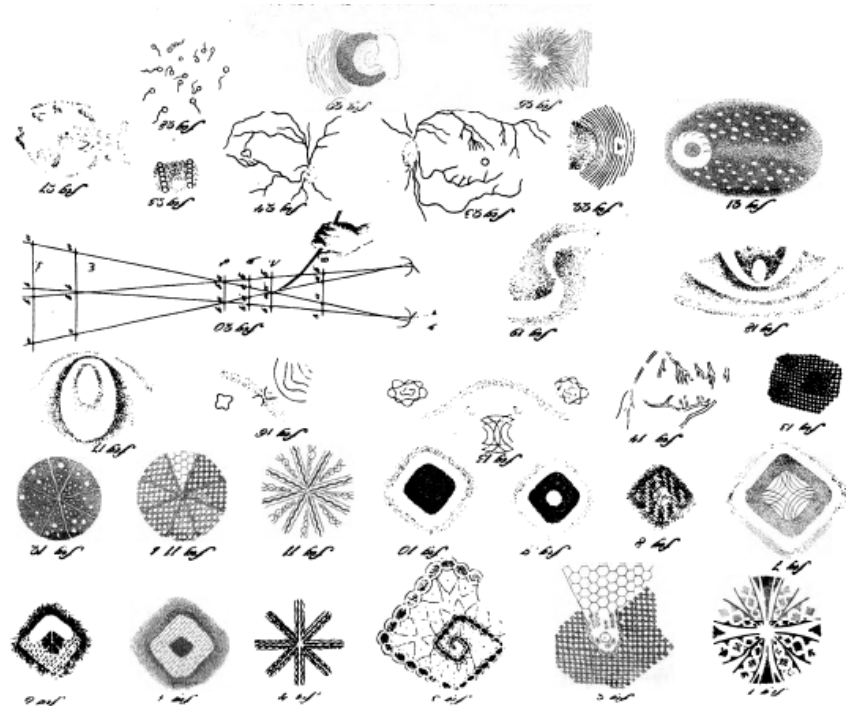


Figure 1 Purkinje's drawings of subjective visual phenomena. Source: Purkinje (1823 [1819]), p. 57.

At first sight, this tradition of subjective vision seems to be nothing more than a radicalization and expansion of Locke's work on secondary qualities. This is, in fact, what Helmholtz thought it to be.¹⁹⁹ It should be noted, however, that this expansion

¹⁹⁷ Purkinje (1819) in Wade & Brožek (2001), p. 63.

¹⁹⁸ See Wade & Brožek (2001), p. 108: “Subjective experience and experiments based on [...] observations were considered as legitimate methods of physiological research, and they could yield physiological insights. Purkinje followed Gruithuisen in using the term ‘heautognostisch’ to signify such experiments of self-exploration. Among the subjective experiences he examined early in his career were those of drugs, vertigo, and vision.”

¹⁹⁹ Helmholtz (1995 [1868]), p. 168.

correlated with an overturning of the Lockean model of perception, that subordinated secondary (subjective) qualities to primary (objective) qualities. In arguing that *all perceptual phenomena* are fundamentally conditioned by the structure and function of the sensory apparatus, Goethe, Purkinje and Müller, by contrast, rendered the mere notion of ‘primary qualities’ utterly redundant. To be more precise, all three argued for the *primacy of the subjective* in the study of perception, and they didn’t consider subjective sensations to be mere aberrations or side effects of the sensory function, but on the contrary, to quote Goethe, as its “the necessary condition.”²⁰⁰ In the same vein, Purkinje concluded from his research that sensory experience is fundamentally underdetermined with respect to its origin, and that hence, it is only slowly that “we become oriented in the circle of existence.”²⁰¹ In other words, the experience of external existence is not given, but generated somehow from undifferentiated states of internal affection.

In sharp contrast to Locke, Müller too maintained that “the subjective sensations of vision form the epistemological foundation” of the study of perception. Hence, the tradition of subjective vision did not so much strive to *include* the subjective dimension of sensibility into the study of perception, as Locke did, but rather to establish subjective reactivity as its very foundation. This epistemological paradigm shift became especially apparent in Müller’s epochal Law of Specific Nerve Energies.

2.5 Müller’s ‘Epistemological Scandal’: The Law of Specific Nerve Energies

With his Law of Specific Nerve Energies, Müller is credited by many for laying the foundation of modern sensory physiology.²⁰² For the purposes of this investigation, a

²⁰⁰ Goethe (1840 [1810]), p. 2.

²⁰¹ Purkinje (1819) in Wade & Brožek (2001), p. 63.

²⁰² For the importance of LoSNE see for example Boring (1950), Schmitz (1996), Norsell et al. (1999), McCarty (2000), Finger & Wade (2002b), Rachlin (2005) and Cassedy (2008). LoSNE in itself was anticipated in the works of Charles Bell, early in the nineteenth century (see for example Boring, 1950; Norsell et al., 1999; Wade, 2005), who has in turn been linked to philosophical traditions going back as far as Plato and Democritus, which all recognized (i) the underdetermined nature of sensory stimulation with respect to its origin, and (ii) the pivotal role of cognitive mediation in perception. Rachlin (2005, p. 42), for example, saw LoSNE anticipated in Descartes work, and in his statement that “nothing reaches our mind from external objects [...] except certain

discussion of LoSNE is indispensable with regard to the foundations of Helmholtz's epistemological position.

The mature statement of the law can be found in the second volume of Müller's *Elements of Physiology* [1833/40], where the general idea is captured as follows:²⁰³

That which through the medium of our senses is actually perceived by the sensorium, is indeed merely a property or change of condition of our nerves; but the imagination and reason are ready to interpret the modifications in the state of the nerves produced [...] as properties of [...] external bodies [...].

Put differently, the law asserts a discontinuity between sensation and its external cause, as the former is defined as a mere underdetermined (internal) state of nervous excitation, that is determined by the modes of reactivity of the physiological system as far as its quality is concerned. LoSNE thus states that:²⁰⁴

All sensations may be excited by internal causes independent of external stimuli. One and the same cause, internal or external, may excite different sensations by acting on different senses. The sensations peculiar to each sense may be excited by several different causes, internal and external. [...] The nerves of each sense are capable of one determinate kind of sensation only.

In his *Elements of Physiology*, Müller systematically lays out his law by means of ten basic principles that form the basis of the theory of perception. The evidence invoked in favor of these principles is mostly based upon introspection, self-experimentation, and experimental work done by others:²⁰⁵

- I. External agencies can give rise to no kind of sensation which cannot also be produced by internal causes, exciting changes in the condition of our nerves.
e.g.: "whenever the auditory nerve is in a state of excitement, the sensations peculiar to it, as the sounds of ringing, humming, etc. are perceived."
- II. The same internal cause excites in the different senses different sensations; - in each sense the sensations peculiar to it.

corporeal motions." A full discussion of the history of ideas that lead up to Müller's work is beyond the scope of this exposition, which will therefore focus on more proximal forerunners of Müller's theorizing in philosophy (Goethe), and physiology (Purkinje).

²⁰³ Müller (1843 [1833/40]), p. 707.

²⁰⁴ Müller (1843 [1833/40]), p. xvi.

²⁰⁵ Principles and examples are quotes from Müller (1843 [1833/40]), p. 707-719.

e.g.: “the accumulation of blood in the capillary vessels of the nerve, as in congestion and inflammation [...] excites in the retina, while the eyes are closed, the sensation of light and luminous flashes.”

- III. The same external cause also gives rise to different sensations in each sense, according to the special endowments of its nerve.
e.g.: “the mechanical influence of a blow, concussion, or pressure excites, for example, in the eye the sensation of light and colours.”
- IV. The peculiar sensations of each nerve of sense can be excited by several distinct causes internal and external.
e.g.: “the sensations of taste may be produced: 1. By chemical substances [...] 2. By electricity [...] 3. By mechanical influences.”
- V. Sensation consists in the sensorium receiving through the medium of the nerves, and as the result of the action of an external cause, a knowledge of certain qualities or conditions, not of external bodies, but of the nerves of sense themselves; and these qualities of the nerves of sense are in all different, the nerve of each sense having its own peculiar quality or energy.
e.g.: “the vibrations of a tuning-fork, which to the ear give the impression of sound, produce in a nerve of feeling or touch the sensation of tickling.”
- VI. The nerve of each sense seems to be capable of one determinate kind of sensation only, and not of those proper to the other organs of sense; hence one nerve of sense cannot take the place and perform the function of the nerve of another sense.
e.g.: “the nerves of touch are capable of no other sensation than that of touch or feeling. Hence, also, no sounds can be heard except by the auditory nerve.”
- VII. It is not known whether the essential cause of the peculiar ‘energy’ of each nerve of sense is seated in the nerve itself, or in the parts of the brain and spinal cord with which it is connected; but it is certain that the central portions of the nerves included in the encephalon are susceptible of their peculiar sensations, independently of the more peripheral portion of the nervous cords which form the means of communication with the external organs of sense.
e.g.: “a patient who had lost one eye [...] produced [...] luminous appearance on the blind side. [...] These sensations (which are analogous to those referred to a limb lost by amputation) continued for several days.”
- VIII. The immediate objects of the perception of our senses are merely particular states induced in the nerves, and felt as sensations either by the nerves themselves or by the sensorium; but inasmuch as the nerves of the senses are material bodies, and therefore participate in the properties of matter generally, occupying space, being susceptible of vibratory motion, and capable of being changed chemically as well as by the action of heat and

electricity, they make known to the sensorium, by virtue of the changes thus produced in them by external causes, not merely their own condition, but also properties and changes of condition of external bodies. The information thus obtained by the senses concerning external nature, varies in each sense, having a relation to the qualities or energies of the nerve.

e.g.: "Fluid bodies, applied to the organs of touch and taste, produce chemical disturbances in their nerves, which excite in each a different sensation; mustard, alkalis, acids, and salts, produce upon the skin, and upon the tongue, totally different effects. Their chemical action must primarily be the same; but the reaction excited differs according to the property of the nerves."

- IX. That sensations are referred from their proper seat towards the exterior, is owing, not to anything in the nature of the nerves themselves, but to the accompanying idea derived from experience.

e.g.: "if we lay our hand upon a table, we become conscious, on a little reflection, that we do not feel the table, but merely that part of our skin which the table touches; but, without this reflection, we confound the sensation on the part of the skin [...] with the idea of resistance."

- X. The mind not only perceives the sensations and interprets them according to ideas previously obtained, but it has a direct influence upon them, imparting to them intensity. This influence of the mind, in the case of the senses which have the power of distinguishing the property of extension in objects, may be confined to definite parts of the sentient organ; in the sense gifted with the power of distinguishing with delicacy intervals of time, it may be confined to particular acts of sensation. It also has the power of giving to one sense a predominant activity.

e.g.: "attention cannot be directed to many impressions at the same time: in proportion as coetaneous impressions on the senses become numerous, the sensations diminish in intensity, or the mind receives one only with distinctness; while the others are only obscurely, or not at all perceived."

Overall, these ten principles can be reduced to four foundational, interdependent 'truths' with regard to the basic structure of sense perception, which will be discussed in what follows.

- (1) Sensations are underdetermined with respect to their cause (internal or external) (Principle I to IV).

Indeed, as Cray describes, Müller's law – an epistemological scandal, according to him – led to a complete blurring of the external-internal distinction in perception, or a

dismantling of the ‘referential illusion’.²⁰⁶ That is to say, the first four principles of the law build the case for what we might call *sensory underdetermination*, i.e. the lack of an inherent link between internal sensations and external causes. All that is given by the sensory apparatus, is a world of underdetermined nervous energies, i.e. qualities determined by the specific sense organ involved, that are not inherently related to an object.

(2) Sensation is to be defined only in reference to the nervous system, not to the external object exciting it (Principle V).

LoSNE implies a bankruptcy of the conception of sensation as a (copy-like) image of external objects or states of affairs, as sensation, according to Müller, is merely “a condition of the nerves, not a property of things.”²⁰⁷ Again, to follow Crary’s analysis, the epistemological shift involved an “overturning of the camera obscura model” as a structuring metaphor for the epistemology of human perception, and a bankruptcy of the idea of the subject as a passive receptor of copy-like images of the external world.²⁰⁸

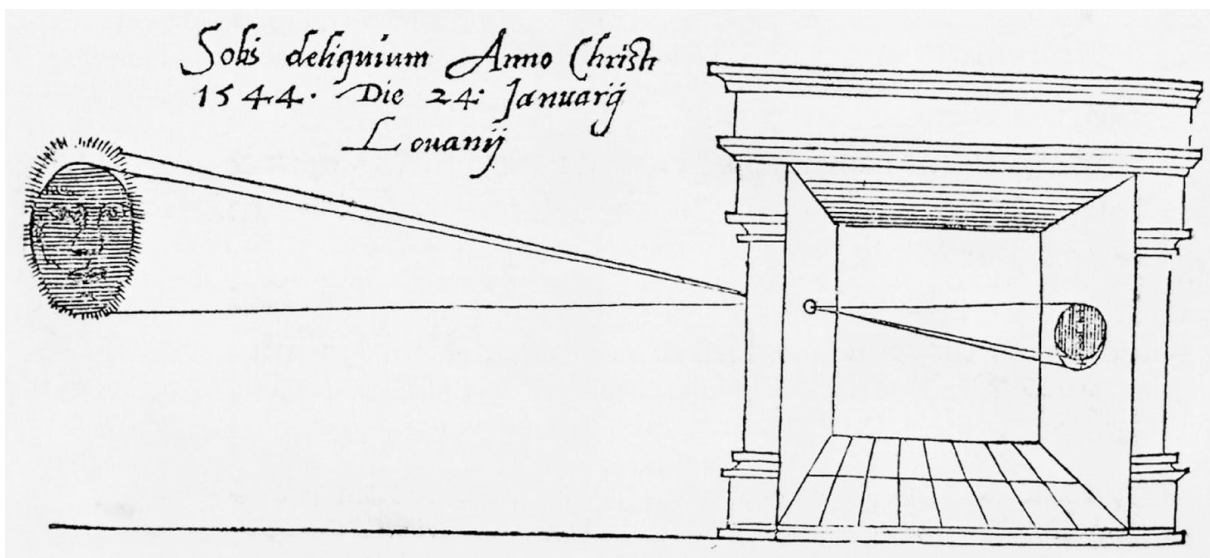


Figure 2 Camera Obscura, drawn by Gemma Frisius (1545).

²⁰⁶ Crary (1992).

²⁰⁷ Müller (1843 [1833/1840]), p. 707.

²⁰⁸ Crary (1992), p. 75.

Furthermore, it should be noted that this changed conception of the notion of 'sensation' correlated with a modified understanding of the concept of 'stimulus', which now becomes a mere generic term referring to, as Cassedy describes, "any agent, external or internal, capable of producing an effect on a nerve," so that "sensation can arise in the absence of 'truth'" and "can be produced by events other than our encounters with external objects or states of affairs."²⁰⁹

- (3) The information conveyed to us by the senses is completely dependent upon the properties of the stimulated sensory nerve (Principle VI-VIII), i.e. upon the specific nerve 'energy' (or better: nerve 'quality').

In Principles VI to VIII, Müller elaborates on the principle of the *specificity* of sensation. Following his argumentation for sensory underdetermination and his physiological definition of sensation, he sets further limits to sensibility by stressing that (i) every one of the five senses is capable of producing only one particular quality (for example sound), and (ii) the particular qualities produced by the different senses are incommensurable (for example sound and smell). Müller is, however, unsure about the specific location of the principle of nerve energies (Principle VII). Helmholtz later described these two foundational assumptions as respectively referring to (i) the particular circle of qualities [Qualitätenkreis] of one sense organ, and (ii) the difference in modality of sensation [Modalität der Empfindung] that "excludes any transition from one to the other."²¹⁰

- (4) Mental processes play a pivotal role in the perceptual processes, the perception of external objects is a necessary synthesis of sensations and ideas (Principles IV and X).

Given that Müller's law implies that the matter of experience (sensation) is completely underdetermined with respect to its origin, the question then becomes how the transition between mere states of nervous excitation and the external world is made, or, in other words, how objective experience arises from 'neutral' states of

²⁰⁹ Cassedy (2008), p. 424. Cassedy (2008, p. 405) ascribes this shift in the understanding of the term of stimulus to the work of Johannes Müller, although he credits Helmholtz for giving it "its most thorough philosophical explanation."

²¹⁰ Helmholtz (1995 [1878b]), p. 345; Helmholtz (1896 [1878b]), p. 219.

excitation. Schmitz describes the problem launched by LoSNE as one of how we can explain that²¹¹

[...] from the event [...] of neutral stimulation, as a mere subjective [...] condition of affection, one concludes to the existence of an objective reality external to our own subjectivity [...]. How is it possible that a consistent stream of consciousness arises from these neutral [...] stimulations?

“How they [our minds] manage this construction,” Rachlin adds, “became the business of all of psychology for the next hundred years.”²¹² Consequently, the latter credits Müller for establishing the basic problem of perceptual psychology.²¹³ From his conception of sensation as an underdetermined state of the nervous system, it follows that perception requires an act of judgment or interpretation.²¹⁴

Müller’s nativism, however, prevented him from developing a full-blown psychological approach to the perceptual process. To begin with, Müller argued that the dynamical opposition between the I and the Not-I, that is determining for perceptual consciousness, is acquired prenatally as an ‘obscure’ representation:²¹⁵

The first obscure idea excited could be no other than that of a sentient passive ‘self’ in contradistinction to something acting upon it. The uterus, which compels the child to assume a determined position, [...] is also the means of exciting in the sensorium of the child the consciousness of something thus distinct from itself and external to it. In this way is gained the idea of an external world as the cause of sensations.

In other words, the differential awareness of an I and a Not-I, according to Müller, is acquired in utero, through the sensible awareness of a contrast between the unmediated feeling of the spatially extended, bodily self, and that which lies outside of it. As such,

²¹¹ Schmitz (1996), p. 49.

²¹² Rachlin (2005), p. 43.

²¹³ Rachlin (2005).

²¹⁴ As Lenoir (1993) points out, Müller’s distinction between the role of ideas [Vorstellungen] and sensations [Empfindungen] is analogous to the difference Kant made between the form and the matter of experience, where the former is a condition of possibility for the determination of the latter. In this respect, it is interesting to note that Müller began his 1826 work by quoting Goethe’s Kantian-inspired credo, that “Content without method leads to fantasy; method without content to empty sophistry; matter without form to cumbersome knowledge, form without matter to hollow speculation [Gehalt ohne Methode führt zur Schwärmerei, Methode ohne Gehalt zum leeren Klügeln, Stoff ohne Form zum beschwerlichen Wissen, Form ohne Stoff zum hohlen Wähnen].”(Goethe as quoted in Müller (1826, p. ii).” Compare with Kant, *CPR* [A51/B75]: “Thoughts without content are empty, intuitions without concepts are blind.”

²¹⁵ Müller (1843 [1833/40]), p. 717; Also see Lenoir (1993).

Müller's theory ultimately relied on the assumption of immediate bodily awareness to explain the genesis of differential consciousness. As Heidelberger aptly describes, "the certainty of the *cogito*, for Müller, is the certainty of the body sensing itself [sich selbst empfindenden Körpers]."²¹⁶ Likewise, Helmholtz's teacher also considered the spatial features of external perception to be due to an inborn mechanism. In vision, Müller stated, spatiality is given in the immediate sensation that the retina has of its own extension. But also more generally, "every point in which a nerve ends, is represented in the sensorium as a spatial particle." The general idea of space in Müller's theorizing thus equally emerged from the immediate awareness of one's own bodily extension.²¹⁷ As a consequence, the spatial form of external perception is determined from birth by the spatial distribution of the nerve endings in the sensory system itself. Indeed, as Müller confirmed, his theory of perception amounts to the peculiar conclusion that the direct object of perception is actually the retina itself, or to borrow Lenoir's expression, for Müller, "the retina is the external world."²¹⁸

However, Müller's identification of the idea of space with the retina's self-sensed extensity, raised the problem of how a single visual field is constructed from two retina's. To address this problem, Müller developed his theory of corresponding retinal points, or the identity theory of spatial perception, which claimed that each point on the left retina corresponds to a point on the right retina, and that both (identical) points arise from a 'common root':²¹⁹

The accordance of the identical points of the two retinae is, therefore, an innate property, and never undergoes any change. The eyes may be compared to two branches with a single root, of which every minute portion bifurcates so as to send a twig to each eye.

According to this theory, a single spatial visual field is thus guaranteed by the innate properties of the visual system. In the end, Müller escaped the problems created by his LoSNE with regard to the subject-object transition in perception, by resorting to innate mechanisms by virtue of which a dynamical and geometrical opposition between the I

²¹⁶ Heidelberger (1997), p. 42 [my translation].

²¹⁷ Müller (1826, p. 40; 1843 [1833/40]), p. 716-717.

²¹⁸ Müller (1843 [1833/40]), p. 739: "The retina, of which the affections are perceived by the sensorium, is itself the field of vision [...]. [...] [F]or the mind projects the images on the retina towards the exterior. [...] [T]he image [...] which we see, is [...] only its representation in the retina." Also see Lenoir (1993), p. 115.

²¹⁹ Müller (1842 [1833/1840]), p. 1197. Also see Helmholtz (1995 [1868]), p. 178: "[T]he [...] difficulty for the Intuitive Theory is that, while we have two retinal pictures, we do not see double. This difficulty was met by the assumption that both retinae when they are excited produce only a single sensation in the brain, and that the several points of each retina correspond with each other, so that each pair of corresponding or 'identical' points produces the sensation of a single one."

and the Not-I are given prior to experience.²²⁰ Indeed, we are prompted to draw the following conclusion, suggested by Post after he had read Müller's work:²²¹

As the doctrine of specific nerve energies establishes the essential subjectivity of all sensations, one could believe, that the question now becomes where these mere subjective experiences derive their objective [gegenständlich-objectiver] nature from. Only, this question does not at all exist for Müller. According to him, sensations are originally [von Haus aus] endowed with a certain degree of objectivity, notwithstanding their complete subjectivity.

It is only by presupposing a primal state of differentiation and an inborn intuition of space, i.e. an original dynamical and geometrical opposition between the bodily self and the world, that Müller can account for the possibility of perceptual experience.²²² This differs significantly from Helmholtz's view, who combined the epistemological consequences of Müller's law, which he considered to lie at the very basis of his physiological epistemology, with a firm criticism of nativism or naturalism. He therefore arrived at a totally different, full-blown psychological account of perceptual objectification.

2.6 Helmholtz's Physiological Epistemology

The impact of Müller's LoSNE on Helmholtz's thought on perception can hardly be overestimated. Every lecture he ever gave on the topic of his theory of perception, starts, almost without exception, with an explanation of LoSNE.²²³ The basic insight of the underdetermined nature of sensation with respect to its origin formed the basis of Helmholtz's physiological epistemology.²²⁴ In 1868, for example, Helmholtz writes:²²⁵

Johannes Müller, as early as the year 1826, when writing that great work on the 'Comparative Physiology of Vision', which marks an epoch in science, was able to lay down the most important principles of the theory of impressions derived from

²²⁰ Schmitz (1996).

²²¹ Post (1905), p. 84 [my translation].

²²² Schmitz (1996).

²²³ See Helmholtz (1852, 1855, 1995 [1868, 1869, 1877a, 1878b, 1892]).

²²⁴ Helmholtz (1995 [1892]), p. 409.

²²⁵ Helmholtz (1995 [1868]), p. 148.

the senses. These principles have not only been confirmed in all important points by subsequent investigation, but have proved of even more extensive application than this eminent physiologist could have suspected.

What the law proves, according to Helmholtz, is basically that there is no “pre-ordained harmony of the inner and the external world”: the states of excitation produced by the nervous system convey no information with respect to the cause of excitation.²²⁶ Consequently, as early as 1852, the young scientist formulated the crucial problem of the study of perception as that of explaining how sensation [Empfindung] comes to be related to external objects and events. In doing so, he once more credits his teacher for articulating the foundational structure of the perceptual relation:²²⁷

We have already seen enough to answer the question whether it is possible to maintain the natural [...] conviction that the quality of our sensations, [...] gives us a true impression of corresponding qualities in the outer world. It is clear that they do not. The question was really decided by Johannes Müller's deduction from well ascertained facts of the law of specific nervous energy.

The Müllerian assumption that “the quality of [...] sensation is dependent principally on the condition of the nervous system, and only in the second place on the condition of the object perceived” determined Helmholtz's conception of sensation as a *sign* or *symbol* for external objects.²²⁸ More particularly, sensation in Helmholtz's theorizing is (i) no more than a “changed condition of the nervous fibers [...] or functional activity,” and (ii) devoid of any resemblance with “the agent inducing it.”²²⁹ Based on LoSNE, Helmholtz states:²³⁰

Our sensations are [...] effects produced by external causes in our organs, and the manner in which one such effect expresses itself depends, of course, essentially on the type of apparatus which is affected. Insofar as the quality of our sensation gives us information about the peculiarity of the external influence stimulating it, it can pass for a sign – but not for an image. For one requires from an image some sort of similarity with the object [...]. A sign, however, need not have any type of similarity with what it is a sign for.

²²⁶ Helmholtz (1995 [1869]), p. 220.

²²⁷ Helmholtz (1995 [1868]), p. 165

²²⁸ Helmholtz (1896), p. 234. Also see Robinson (1986), Thomas-Fogiel (2005)

²²⁹ Helmholtz (1995 [1868]), p. 149. Also see Helmholtz (1995 [1892]), p. 408: “I have [...] believed it necessary so to formulate the relationship between the sensation and its object such that I would interpret the sensation only as a sign [...]. No similarity is necessary between it and its object, just as little as that between the spoken word and the object that we designate thereby.”

²³⁰ Helmholtz (1995 [1878b]), p. 347.

In short, Helmholtz accepted the intrinsically underdetermined nature of sensory experience, and invoked LoSNE as an argument in support of the unknowability of his category of *Reality* (see chapter 1).

Helmholtz's research on sensory physiology furthermore lead him to expand Müller's insights in two different ways. Firstly, during his work on color vision in the early 1850s, Helmholtz became convinced that his contemporary Thomas Young's trichromatic theory of color provided a "further extension of Johannes Müller's law."²³¹ In this theory, Young hypothesized that the specificity of color sensations must be ascribed to the specific reactivity of retinal receptors to different wavelengths of light. He distinguished three such receptors, respectively sensitive to the wavelength associated with red, green and violet.²³² Through his experimental work on color mixing and his observation of subjects suffering from color blindness, Helmholtz provided further empirical evidence for Young's theory.²³³ In contrast to Young, however, Helmholtz did not speak of different 'receptors', but rather of different nerve fibers, and additionally hypothesized that while each of these fibers has its own wavelength specificity, they would still react faintly when stimulated by the other two.²³⁴ This theory of color, which assumes that color vision emerges from three different (although partially overlapping) nerve sensitivities in the retina, would later become known as the Young-Helmholtz theory, and besides providing a good explanation for color blindness and anticipating the modern cone theory of vision, Helmholtz construed it as a further extension of Müller's law in the following manner:²³⁵

Just as the difference of sensation of light and warmth depends demonstrably upon whether the rays of the sun fall upon nerves of sight or nerves of feeling, so it is supposed in Young's hypothesis that the difference of sensation of colours depends simply upon whether one or the other kind of nervous fibers are more strongly affected.

Secondly, Helmholtz developed an analogous hypothesis in the field of acoustics, by means of his experimental investigation of the origin of tonal specificity, published in his 1863 *On the Sensations of Tone*. In this work, the scientist outlines the results of his experimental research on the sensation of tones, which convincingly demonstrates that

²³¹ Helmholtz (1995 [1868]), p. 161.

²³² *Ibid.*

²³³ In this respect, see especially the second volume of Helmholtz's *Handbuch* (1867 [1856/66]); Koenigsberger (1902/1903).

²³⁴ Helmholtz (1867 [1856/1866], II); Finger & Wade (2002b).

²³⁵ Helmholtz (1995 [1868]), p. 161.

individual frequencies are associated with the specific receptivity of the nerve fibers in the cochlea.²³⁶ These sensory elements, which Helmholtz identified to most likely be the arches of Corti, would behave much like piano strings, with each particular element resonating in response to a specific tone.²³⁷ From this research, Helmholtz concluded that.²³⁸

The sensation of different pitch would [...] be a sensation in different nerve fibers. The sensation of a quality of tone would depend upon the power of a given compound tone to set in vibration [...] different groups of nerve fibres. [...] This is a step similar to that taken in a wider field by Johannes Müller. [...] The qualitative difference of pitch and quality of tone is reduced to a difference in the fibres of the nerves receiving the sensation.

In contrast to his teacher, who relied heavily on rudimentary self-experimentation and self-observation, Helmholtz took LoSNE into the lab, so to speak, and in doing so, succeeded in extending Müller's case for sensory specificity, by showing that there is not only a *modal* difference in sensory qualities, i.e. a difference across sensory systems, as Müller argued, but moreover a *qualitative* one, that applies to the sensations produced *within* a single sensory system.²³⁹

Most importantly, Helmholtz claimed that LoSNE had far-reaching epistemological consequences, and he famously interpreted Müller's (extended) LoSNE as providing a physiological basis for Kant's *a priori* forms of intuition. In doing so, he set the stage for the (relatively unknown) movement of physiological neo-Kantianism in the nineteenth century.²⁴⁰ Just like Kant had argued that every possible experience is necessarily

²³⁶ Helmholtz (1912 [1863]), p. 148. An extensive description of the various measurement instruments developed by Helmholtz in the context of his acoustic research can be found in Meulders (2010). For a recent monograph on Helmholtz's work in acoustics and its general relevance, see Steege (2012).

²³⁷ Helmholtz (1912 [1863]); Meulders (2010), p. 170. Also see Helmholtz (1995 [1869]), p. 221: "It appears highly probable that even the sensations of different colours and different pitch, as well as qualitative peculiarities of luminous sensations inter se, and of sonorous sensations inter se, also depend on the excitation of systems of fibers, with distinct character and endowed with different specific energy [...]" Furthermore, Helmholtz pointed out that it is not so much the specificity of sensory nerves that determines the peculiar quality of sensation, as his dear friend, Emil du Bois-Reymond, had proven that "all nerves have the same electro-motor actions [...] in all of them the condition of excitation is called forth by the same mechanical, electrical, chemical, or thermometric changes." Rather the quality of sensation is determined by the "organ to which the nerve is united, and to which it transmits the state of excitation." (Helmholtz, 1995 [1868], p. 149). For an extensive discussion of the way in which Helmholtz extended Müller's Law, see Finger & Wade (2002b).

²³⁸ Helmholtz (1912 [1863]), p. 148.

²³⁹ Helmholtz (1995 [1868, 1878b]).

²⁴⁰ For Helmholtz's influence on the development of the early neo-Kantian movement, see for example Ollig (1979), Schnädelbach (1984), Schmitz (1996), Ferrari (1997), Friedman (2006, 2009), and Makkreel & Luft (2010).

conditioned by the *a priori* forms of intuition and the categories of thought, Müller had shown that the fundamental material of perception (sensation) is conditioned and determined by our physiological make-up.²⁴¹ Therefore, LoSNE could be invoked in support of the unknowability of the *Real*, and to undermine the view of the perceptual process as a direct reflection of the thing-in-itself.²⁴² In short, LoSNE, according to Helmholtz, provided strong evidence for an anti-objectivist epistemology and restored the intrinsic unknowability of the thing-in-itself.²⁴³ In 1855, Helmholtz states that Müller's insights signified²⁴⁴

[...] one of the most significant advances in sense physiology in recent times. According to it, the quality of our sensations [...] does not depend upon the perceived external objects, but on the sensory nerves which mediate sensation. [...] Just the same what the physiology of the senses has proven in recent times, Kant sought to prove earlier [...], by pointing out the share that our [...] mental organization [Organisation des Geistes] has in the formation of ideas [Vorstellungen].

Later on in his career, Helmholtz maintained that Müller's law is "an empirical statement of Kant's theoretical exposition with regard to the nature of the human faculty of knowledge," and "presented and made evident the nature and meaning of [...] the subjective form of sensation."²⁴⁵ In the first as well as the second version of the *Treatise*, Helmholtz credited Müller with providing a scientific basis for Kant's "so called transcendental forms of intuition and thought, given *a priori* to any experience, in which every content of our representation is necessarily taken up."²⁴⁶ In short, according to Helmholtz, the epistemological consequence of LoSNE was that any investigation into

²⁴¹ See for example Kant, *CPR* [A20/B34] [boldface in original text]: "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 sensations its **matter**, but that which allows the manifold of appearance to be intuited as ordered in certain relations I call the **form** of appearances. [...] [T]he 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 sensation." Whereas Kant determined the forms of intuition to be time and space, in Helmholtz's physiological interpretation they refer to the quality of sensation (see section 2.7).

²⁴² See for example Stumpf (1895), p. 4: "[T]here arose with Müller, and also in his school, the clear [...] consciousness of the incompatibility of perception, and of psychological events in general, with the processes of the outer world."

²⁴³ Robinson (1986).

²⁴⁴ Helmholtz (1896 [1855]), p. 98-99 [my translation].

²⁴⁵ Helmholtz (1896), p. 249; Helmholtz (1896 [1878b]), p. 345.

²⁴⁶ Helmholtz (1896), p. 584. Also see Helmholtz (1867 [1856/1866], III), p. 456.

the origin and ground of the object necessarily proceeded from the conditioning role of subjective organization, which hence meant a return to Kant's critical analysis of experience.

In the wake of Helmholtz's and Müller's work, or more generally the tradition of subjective vision in philosophy and physiology, thus arose an early "back to Kant" movement, that invoked results of natural science in support of a critical anti-objectivism, and called for a renewed appreciation of the "impossibility to liberate oneself of the 'magical circle' of the relation between the subject and the object."²⁴⁷

Although the discussion of Helmholtz's relation to Kant is reserved in the fourth chapter, his Kantian interpretation of LoSNE, i.e. the foundation of his physiological epistemology, calls for some further explanation and critical reflection. Helmholtz has often been described as the one to naturalize Kantian epistemology, but for the sake of clarity, it is useful to distinguish between his physiological interpretation of the Kantian forms of intuition on the one hand, and his transformation of the category of causality (a form of understanding) in terms of a psychological urge [Trieb] or instinct.²⁴⁸ Hence, Helmholtz's naturalized Kantianism has a physiological as well as a psychological dimension. As such, the 'naturalization of Kant' within the framework of Helmholtz's theorizing is to be understood in terms of his identification of Kant's formal forms of intuition and understanding with the perceiver's physiological organization and psychological 'hardware' respectively. In chapter 4, the latter will be considered, but for now, let us restrict ourselves to the former.

2.7 (The Sense and Nonsense of) Physiological Neo-Kantianism

The movement of physiological neo-Kantianism originated in Helmholtz's Kantian interpretation of Müller, and culminated in Friedrich Albert Lange's 1866 *History of Materialism*. Lange had attended Helmholtz's lectures as a student and credited him for having pointed out the congruence of the facts of physiology with Kant's transcendental

²⁴⁷ Ferrari (1997), p. 21

²⁴⁸ Helmholtz (1867 [1856/1866], III), p. 455. For the different interpretations of Helmholtz's naturalized Kantianism, see below and chapter 4.

aesthetics, and his restoration of the thing-in-itself in face of objectivism.²⁴⁹ According to Lange, Helmholtz’s sign theory of sensation prompts us to conclude to “the existence of a transcendental order of things.”²⁵⁰ This early neo-Kantian movement primarily aimed at countering objectivism, by emphasizing the mediating role of subjective organization in the perceptual process, and, by extension, in the attainment of objective knowledge.²⁵¹ Because of its physiological interpretation, however, the meaning of the Kantian *a priori* was expanded so dramatically, that according to some, it lost its very meaning.²⁵² Therefore, the idea of a physiological neo-Kantianism soon encountered resistance for a number of reasons.

One obvious objection to Helmholtz’s Kantian interpretation of LoSNE is that Kant himself explicitly denied that the quality of sensation is an *a priori* form of intuition, and that hence, it makes no sense to align Müller’s theorizing with the critical philosopher’s thesis concerning the *a priori* forms of intuition.²⁵³ It would thus be correct to state that Helmholtz’s physiological interpretation contradicts the letter of Kantianism. However, a far more detrimental criticism would be that it is not even in accordance with the spirit of Kant’s *Critiques*. And indeed, in the wake of Helmholtz’s work, numerous criticisms arose that pertained to the way in which his reinterpretation of the Kantian *a priori* diverged from the general rationale of Kant’s critical analysis of experience and knowledge.

For starters, the Prussian philosopher famously set his transcendental approach apart from what he called the ‘physiology of understanding’, i.e. the attempt to grasp the ground of objective experience and knowledge by analyzing its genetic origin and formative history in the empirical subject.²⁵⁴ Whereas Kant aimed at determining the necessary subjective conditions of knowledge through a transcendental regression to its formal constitutive elements, Helmholtz (and Müller) arrive at the primacy of underdetermined sensation by decomposing experience to its most basic elements, i.e. physiological states of the body. This not only alters the meaning of the *a priori*, by more

²⁴⁹ Lange (1881 [1866]). For a discussion of Lange’s physiological neo-Kantianism and the way it was inspired by Helmholtz, see Teo (2002). On the philosophical significance of Müller’s law for the development of physiological neo-Kantianism, also see Liebmann (1869), p. 32: “This law of specific nerve energies is [...] a late *a posteriori* confirmation of the philosophical doctrine of the subjectivity of sensible perception, that had been long established through philosophical reflection [...]. Light, pressure or taste [...] these qualities arise first in us, and are nowhere outside us.”

²⁵⁰ Lange (1881 [1866]), p. 230.

²⁵¹ Ollig (1979); Skidelsky (2008)

²⁵² See for example Cohen’s (1871) criticism of the physiological interpretation of Kant’s epistemology.

²⁵³ See Kant *CPR* [A175/B217] [boldface in original text]: “The **quality** of sensation is always merely empirical and cannot be represented *a priori* at all (e.g. colours, tastes, etc).”

²⁵⁴ Kant, *CPR* [AIX].

importantly, its systematic place in the theory of knowledge. To be more precise, Helmholtz's physiological *a priori* does not denote a formal feature of experience, but a fact about the physiological functioning of the sensitive apparatus, thus dissolving a Kantian necessity into the contingency of the empirical subject.²⁵⁵ More important, however, is the transformation of the systematic place of the physiologized *a priori* in the theory of knowledge, when we compare it with Kant's formal principle of aprioricity.

If we take the specificity of the Kantian analysis of experience to be the way in which it unites a positive and a negative claim with regard to the conditioning function of the subject, i.e. subjective organization as the *condition of possibility* for, as well as the *limit* of experience and knowledge, LoSNE is aspecific with regard to it, as it incorporates only the negative thesis. To be sure, one could argue that LoSNE in a way produced a radical change of perspective in the physiology of sense perception, which can be understood in analogy with Kant's Copernican turn in epistemology.²⁵⁶ However, the *a priori* determination of possible experience through LoSNE hardly entails the positive thesis of Kantian philosophy, quite the contrary. What Müller's law intends to prove, is, first and foremost, that the body (as the locus of subjective organization) is capable of producing experience *that has no external correlate whatsoever*. Or, in other words, it provides a *subjectivist argument* against objectivism, by showing that the body has, in Crary's words, "an innate capacity, one might even say a transcendental faculty, to misperceive."²⁵⁷ If anything, the physiological *a priori*, which founds sensory *underdetermination*, and not the *determinability* of sensory experience, expresses the *a priori* predisposition for hallucination. In the end, the physiological interpretation of the *a priori* is thus more of an *articulation* of the 'enigma of knowledge' than its solution.²⁵⁸ As such, the Kantian

²⁵⁵ On the relation between Helmholtz's theory and Kant's concept of necessity, also see chapter 4, section 4.6.2.

²⁵⁶ Kant, *CPR* [BXVI-BXVII] [italics and boldface in original]: "[L]et us once try whether we do not get farther with the problems [...] by assuming that the objects must conform to our cognition, which would agree better with the requested possibility of an *a priori* cognition of them, which is to establish something about objects before they are given to us. This would be just like the first thoughts of Copernicus, who, when he did not make good progress in the explanation of the celestial motions if he assumed that the entire celestial host revolves around the observer, tried to see if he might not have greater success if he made the observer revolve and left the stars at rest. Now in metaphysics we can try in a similar way regarding the **intuition** of objects. If intuition has to conform to the constitution of objects, then I do not see how we can know anything of them *a priori*; but if the object [...] conforms to the constitution of our faculty of intuition, then I can very well represent this possibility to myself. [...] [E]xperience itself is a kind of cognition requiring the understanding, whose rule I have to presuppose in myself before any object is given to me, hence *a priori*, [...] to which all objects of experience must therefore necessarily conform."

²⁵⁷ Crary (1992), p. 90.

²⁵⁸ Cassirer (1912), p. 254.

forms of intuition as preconditions to knowledge are transformed into empirical facts about the structure of the physiological body, which function as *conditions of impossibility* for direct knowledge about the Real.

As a consequence of this dramatic shift in the systematic place of the *a priori*, Kant's transcendental philosophy and pre-Kantian subjectivism become almost indistinguishable. As Rowlands puts it, if one understands by neo-Kantianism "the view that there are activities [...] whose function it is to structure experience," the category is excessively broad – actually including thinkers that predate the Prussian philosopher – and one will be led to the awkward conclusion that "Locke, Berkeley and Hume were all neo-Kantians."²⁵⁹ The 'slippery slope' that is set in motion by the concept of a physiological *a priori*, is aptly described by Skidelsky:²⁶⁰

The first generation of neo-Kantians interpreted Kant's principle of aprioricity in a strictly naturalistic sense. They understood it in light of Müller's law [...] – the law, [...] that sensation [...] is molded by our physiological organization. [...] An originally purely experimental project thus acquired broader philosophical significance. [...] 'Matter in general,' wrote Lange, 'may just as well be merely a product of my organisation [...]' From here [...] it was only a short step to the phenomenalism of Mach. What had begun as a revision of Kantianism ended up as its dissolution.

The core problem with regard to the physiological interpretation of the *a priori* thus seems to pertain mainly to its inherent tendency towards (pre-Kantian) *subjectivism*.²⁶¹ It is no wonder, then, that the movement of physiological neo-Kantianism soon faced serious criticism, as for example by Cohen in his 1871 *Kant's Theorie der Erfahrung*, who famously called for a return to the *historical* Kant in the backlash of these early reuptakes of Kant's critical analysis.

We are thus prompted to conclude that the epistemological implications of LoSNE alone do not specifically call for a Kantian interpretation. The anti-objectivist epistemology that is derived from it can not only be recuperated in a Kantian framework, but could likewise be invoked in support of phenomenalism, scepticism and fictionalism, or in short, all forms of subjectivism.

However, one could say that the positive thesis of Kantianism is incorporated in Helmholtz's *psychologized* adoption of the category of causality. This will lead us to reconsider the case of Helmholtz's Kantianism in chapter 4. But it remains that

²⁵⁹ Rowlands (2004), p. ix.

²⁶⁰ Skidelsky (2008), p. 28.

²⁶¹ In this perspective, it is understandable that Hatfield (1992, p. 152) prefers the term 'physiological subjectivism' in the context of Müller's theorizing, instead of physiological neo-Kantianism.

Helmholtz's interpretation of LoSNE was more philosophically neutral than he thought it to be, and that LoSNE provides a good argument for an anti-objectivist stance, but does not in and by itself call for a Kantian interpretation.

In what follows, we return to our discussion of the physiological roots of Helmholtz's epistemology, in which we need to take one last step. A step that at once concludes this chapter and provides an introduction to the next ones, which deal with the psychological dimension of Helmholtz's work. The final matter at stake in this chapter is that of his rejection of nativism or psychological reductionism, which paved the way for his psychology of the object as an autonomous field of inquiry.

2.8 Helmholtz's Anti-Reductionism: The Autonomy of Psychology

As suggested in the beginning of this chapter (see sections 2.2 and 2.3), Helmholtz's physiological reductionism contrasts sharply with his non-reductionist view of psychology, i.e. his emphasis on the irreducibility of psychological processes to physical or physiological mechanisms. With regard to the question of reductionism in both disciplines, Helmholtz's stance is the perfect mirror image of his teacher's, who argued for "the autonomy of life over and against the physical realm," but likewise defended a form of biological reductionism with respect to the psychological realm, through his nativism.²⁶²

In contrast to Johannes Müller, Helmholtz stressed the complete autonomy of psychology *vis-à-vis* physical research on the one hand, and that of physiological investigation on the other. This is reflected for example in his multi-layered theory of perception, which passes through three distinct levels of analysis:²⁶³

[T]he *physical* characters of the eye as an optical instrument; next the *physiological* processes of excitation and conduction in the parts of the nervous system which belong to it; and lastly [...] the *psychological* question, how mental apprehensions are produced by the changes which take place in the optic nerve

²⁶² Heidelberger (1997), p. 4 [my translation].

²⁶³ Helmholtz (1995 [1868]), p. 128.

Helmholtz's psychological project is articulated first and foremost as an attempt to overcome the nativist endeavor to turn psychology into the 'stepdaughter' of physiology, and as such, to establish psychological research as an independent field of inquiry.²⁶⁴ In Helmholtz's time, the nativist hypothesis was defended not only by Müller, but more importantly by Ewald Hering – Purkinje's successor at the university of Prague – who was strongly influenced by Müller's views, and likewise defended the identity theory of spatial perception.²⁶⁵ Hering was without doubt Helmholtz's greatest opponent. The exceptional intensity of the controversy between both scientists is testified in Turner's remarkable 1994 monograph on the matter, but, in the context of this exposition, the details of this controversy will be left aside. Rather, we will focus on the argumentative strategies employed by Helmholtz in order to establish the autonomy of psychological research over and against the nativist hypothesis that "complete ideas of objects are produced by the organic mechanisms."²⁶⁶ In contrast to nativism, Helmholtz argued, his theory "does not assume any peculiar modes of physiological action in the nervous system, nor any hypothetical anatomical structures," but instead considers the idea of the external in perception to be the result of an "act of our power of realization [Vorstellungsvermögen]."²⁶⁷ To delineate his theory from nativism, Helmholtz used the term 'empiricism', although his theorizing goes well beyond the strict empiricist framework.²⁶⁸ Still, the "dramatic juxtaposition" between both schools seemed to be one of Helmholtz's most salient rhetorical strategies, as Turner notes.²⁶⁹

The greatest bone of contention between both schools pertained to the way in which spatial representation originates from non-spatial subjective states of excitation:²⁷⁰

[I]t may often be rather hard to say how much of our apperceptions [Anschauungen] [...] is due directly to sensation, and how much of them [...] is due to experience and training. The main point of controversy between various

²⁶⁴ Turner (1994), p. 71.

²⁶⁵ Boring (1950); Hatfield (1992); Turner (1994); Meulders (2010).

²⁶⁶ Helmholtz (1995 [1878b]), p. 357; Helmholtz (1867 [1856/1866], I), p. 44.

²⁶⁷ Helmholtz (1995 [1868]), p. 194.

²⁶⁸ See for example Helmholtz (1867 [1856/66], 1868, 1896). The details of the empiricist dimension, and its relation with the Kantian and Fichtean strands of Helmholtz's psychology will be thoroughly discussed in the next chapters.

²⁶⁹ Turner (1993), p. 191. The nativism-empiricism opposition is a returning topic in Helmholtz's writings, and it is generally agreed upon that Helmholtz actually coined the distinction itself (Pastore, 1971; Turner, 1994; Heidelberger, 1999). For references to the debate in Helmholtz's work, see for example Helmholtz (1868, 1869, 1878b).

²⁷⁰ Helmholtz (1925 [1856/1866], III), p. 10.

investigators [...] is connected with this difficulty. Some are disposed to concede to the influence of experience as much scope as possible, and to derive from it especially all notion of space. This view may be called the empirical theory [empiristische Theorie]. Others [...] believe it is necessary to assume a system of innate apperceptions [...] especially with respect to space-relations. In contradistinction to the former view, this may perhaps be called the intuition theory [nativistische Theorie] [...].

Helmholtz, however, acknowledged that the choice between the two opposing theories is a matter of *disposition* [Neigung], and reluctantly admits that, for the time being “a refutation of the nativist theory is not possible.”²⁷¹

Time and again, Helmholtz invoked three arguments against the nativist theory, namely (i) its low explanatory power, (ii) its metaphysical audacity, and (iii) its redundancy:²⁷²

[T]he nativistic hypotheses explain, [...] nothing. [...] [T]hey only assume the very fact to be explained, in that they simultaneously reject the possible reduction of the fact to the safely established mental processes [...]. Second, the assumption of all nativistic theories that complete ideas of objects are produced by the organic mechanism seems much more audacious and dubious than the assumption of the empiricist theory, that only the uncomprehended material of sensations derives from external influences, while all ideas are formed out of it according to the laws of thought. Third, the nativist assumptions are unnecessary.

So, firstly, Helmholtz maintained that if it is possible to analyze representations as the result of a mental act, this is to be preferred above explanations that remain “the slave of the factum” as Liebmann once formulated it.²⁷³ Secondly (but the third point in the quote), Helmholtz appealed to the principle of parsimony. Nativism, according to him, invokes the ‘unnecessary hypothesis’ of inborn mechanisms, thereby violating the “general [...] rule of scientific examination, not to build new hypotheses as long as the known facts suffice for the explanation.”²⁷⁴ In 1868, Helmholtz specified these ‘known facts’, i.e. the laws of thought, as the “well known association between the impressions we receive and the conclusions we draw from them [...].” However, as will become clear

²⁷¹ Helmholtz (1867 [1856/1866], III), p. 435, 441.

²⁷² Helmholtz (1995 [1878b]), p. 357; also see Helmholtz (1867 [1856/1866], III), p. 441-442. For a systematic analysis of Helmholtz's arguments against nativism, see Hatfield (1992).

²⁷³ Liebmann (1911), p. 177.

²⁷⁴ Helmholtz (1867 [1856/1866], III), p. 441.

later on, the laws Helmholtz invoked to account for the origin of external perception exceed the empiricist, associationist framework by far.²⁷⁵

Yet the final and most intriguing argument Helmholtz articulated against nativism is its metaphysical audacity (the second point in the quote). More particularly, in several occasions, Helmholtz contended that the nativist approach is based on the metaphysical assumption of a pre-established harmony between mind and matter, and consequently presents a naturalized version of absolute idealism.²⁷⁶ The doctrine of pre-established harmony was first articulated as a solution to the mind-body problem by Leibniz in his *New System of Nature* in 1695. In this work, the philosopher famously stated that mind and body are like “two clocks or watches which perfectly agree.”²⁷⁷ Helmholtz, however, never mentioned Leibniz’s philosophy in this respect, and it seems that he used the term ‘pre-established harmony’ quite broadly, to denote any theory which, according to him, supposed a representative similarity between subject and object.²⁷⁸ Both absolute idealism and nativism, Helmholtz argued, answer the question as to what “the extent [is] to which our representations correspond to objects” by assuming²⁷⁹

[...] a pre-established harmony between nature and mind [Natur und Geiste], or [...] an identity between Nature and mind, as Nature was viewed as the product of the activity of a general mind, from which the human mind emanates. The nativist theory of spatial perception is related to these perspectives [i.e. absolute idealism], as it accounts for the genesis of percepts which [...] correspond to actuality [...] through innate mechanisms and a [...] pre-established harmony.

Consequently, Helmholtz rejected the nativist identity theory of spatial perception, which assimilates spatial representation to the physiological structure of the body,

²⁷⁵ Helmholtz (1995 [1868]), p. 194.

²⁷⁶ See among others Helmholtz (1867 [1856/66], 1995 [1868, 1869, 1870, 1878b]); also see Lenoir (1993).

²⁷⁷ Leibniz (2004 [1695]), p. 77.

²⁷⁸ Helmholtz used the argument against pre-established harmony to counter absolute idealism, Kantianism and nativism. Compare for example Helmholtz (1867 [1856/66], 1995 [1870, 1878b]).

²⁷⁹ Helmholtz (1867 [1856/1866], III), p. 442. When Helmholtz referred to absolute idealism, what he especially seemed to have in mind was the Hegelian assumption of a metaphysical continuity between mind and matter, a view that Pippin (1991, p. 534) summarizes as follows: “Hegel’s developmentalism appears based on some grand metaphysical claim about the underlying ideal or spiritual nature of reality, first “expressing itself” externally in nature, and then “returning” from such “external” manifestations to the internal, and finally full self-consciousness expressions of ‘Absolute Spirit.’” Helmholtz (1995 [1862], p. 79) attacked Hegel’s metaphysical system on the grounds that it assumed the whole of physical reality to be “the result of an act of thought on the part of a creative mind,” and hence implied that it was “competent for the human mind, even without the guidance of external experience, to think over again the thoughts of the Creator, and to rediscover them by its own inner activity.”

because of its metaphysical superstructure, i.e. the pre-established harmony between the physiological structure of the body and the external object.

It should be mentioned that Helmholtz used the same arguments to refute “materialistic opinions” in the study of perception, which assimilate (or even identify) mental representations to brain processes. Although Helmholtz spent quite some time refuting psychological reductionism or nativism, he also clearly conceived of psychological materialism, i.e., the reduction of the mind to the brain, as utterly absurd. In 1867, he ironically asks²⁸⁰

[...] what similarity can be imagined between the process in the brain that is concomitant with the representation [Vorstellung] of a table and the table itself? [...] Perspective projections of the external world in the brain hemispheres [...] are obviously not enough to represent a bodily object. [...] [A]n electrical reproduction of the table in the brain would be simply another bodily object to be perceived, but not the representation of a table.

Through his rejection of physiological and physical reductionism, the concept of representation [Vorstellung] slowly emerges as a complex, irreducible psychological phenomenon, that has its ground and formative history in the mind. Helmholtz thus paved the way for psychology as an autonomous discipline, by freeing it from the grip of physiological determinism, and claiming the mental realm as a level of analysis in its own right.

2.9 Summary and Conclusion

In this chapter, we reconstructed the physiological and philosophical background of Helmholtz's psychological problematization of the object. A returning topic in this investigation was the assumption of pre-established harmony between subject and object, and more importantly, the way in which the lack thereof necessitates a psychology of perceptual experience, according to Helmholtz.

It is clear from this investigation, that what Foucault called modernity's most radical epistemological event (see section 1.2.2), i.e. the gradual crumbling of the unity between subject and object, found its ultimate physiological expression in Müllers LoSNE. In LoSNE, Helmholtz found a solid scientific argument against naïve realism and

²⁸⁰ Helmholtz (1925 [1856/66], III), p. 20; Helmholtz (1867 [1856/1866], III), p. 443.

objectivism, and a motive for a thorough problematization of the perceptual process. Furthermore, we have discussed the sense and nonsense of the physiological strand of neo-Kantianism that arose in the wake of Müller's 'epistemological scandal' in general, and Helmholtz's Kantian interpretation of Müller's law in particular. In that context, we argued that LoSNE in itself does not call for a Kantian interpretation, but can be recuperated by all forms of subjectivism, thus casting a shadow of doubt over the term 'physiological neo-Kantianism'.

Subsequently, we analysed Helmholtz's philosophical arguments against psychological reductionism or nativism, and in favour of the autonomy of psychology as a level of analysis in its own right. Again, we were confronted with Helmholtz's anti-metaphysical attitude, and more specifically, with his criticism of the metaphysical audacity of the nativist hypothesis, that allegedly assumes a pre-representative similarity between the anatomico-physiological structure of the body, and the external object. According to Helmholtz, it is not the body, but a 'peculiar mental activity' that mediates the transition from pure states of excitation to the representation of an object.²⁸¹ In the end, we are led to conclude that it was the particular combination of (i) the epistemological consequences of LoSNE, and (ii) the rejection of nativism or psychological reductionism, that prompted Helmholtz's to consider the perceptual object as the result of an irreducible mental process.

After thus establishing the motives for Helmholtz's psychological approach to the object, we can now proceed to analyse the different levels of analysis in his psychology, along the lines of interpretation as outlined in chapter 1 (section 1.3). As a first step in this analysis, we will consider Helmholtz's empiricism.

²⁸¹ Helmholtz (1995 [1857]), p. 66.

Chapter 3

Empiricism and the Object: From Hume to Helmholtz

Nothing is more curiously enquir'd after by the mind of man, than the causes of every phaenomenon [...]. And how must we be disappointed, when we learn that this connexion, tie, or energy lies merely in ourselves, and is nothing but that determination of the mind [...]?

- David Hume (1969 [1739/40]), p. 313-314.

3.1 Introduction

As explained in the previous chapter, Helmholtz's psychological perspective on perception was determined in part by his non-reductionism with regard to the mind, or, as some would say, his epistemological dualism with regard to the mind-body relation.²⁸² Helmholtz's non-reductionist stance provides a first important route for understanding his general take on the psychological problem of the object, i.e. as a problem that is not

²⁸² 'Epistemological dualism', in this context, refers to the philosophical stance that refuses to explain states of the mind in terms of states of the body; as such, it is opposed to Müller's monistic epistemology that is implied in his reduction of the psychological problem of the object to inborn physiological mechanisms. There has been considerable wrangling over the possible metaphysical stakes of the empiricism-nativism debate, and, more particularly, over the way in which Helmholtz's psychological non-reductionism amounts to a metaphysical dualist position with regard to the relation of mind and matter (as described in Hatfield, 1990, p. 182). These discussions will be left aside, however, given the lack of textual evidence in support of that claim, and Helmholtz's explicitly anti-metaphysical stance.

reducible to biological modes of explanation. Apart from the question concerning the autonomy of psychological investigation, however, there is also the issue of its appropriate methodology, which will be addressed in this chapter. Most generally, it will be argued that although Helmholtz opens up the domain of psychology as an autonomous area of investigation through his rejection of biological reductionism (or nativism), the specificity and nature of the empiricist dimension of his work should be understood against the background of British and Scottish empiricist philosophy.²⁸³

The discussion of the empirical dimension of Helmholtz's psychology of the object, however, provides only a partial insight into his theorizing, which has to be complemented with an analysis of his indebtedness to Kant and Fichte. In accordance with the systematic-historical viewpoint of this dissertation, this third chapter therefore aims to answer two interrelated questions, namely (i) what are the historical precedents to the empirical dimension in Helmholtz's work, and (ii) in what way does the empiricist framework itself provide 'the seed and motive', as Cassirer put it, for the critical account of experience in general, and for Helmholtz's shift towards the transcendental theories of Kant and Fichte in particular.²⁸⁴ Before we delve into these questions, however, some preliminary clarifications are in order.

3.1.1 Preliminary Clarifications: Empiricism and the Mind

The term empiricism in this chapter refers to *methodological naturalism* with regard to the mind, as distinguished from *metaphysical naturalism*, defined by Hatfield as follows.²⁸⁵

²⁸³ This take on the matter opposes that presented by Boring (1950) and Singh (1991), among others, who both portray Helmholtz as a strict empiricist opposing German idealism in general, and Kant in particular. As illustrated by the statements of Helmholtz himself on that matter, as well as by the vast amount of secondary literature on Helmholtz's relation to German idealism, this interpretation can only be the result of a very partial reading of Helmholtz's work.

²⁸⁴ Cassirer (1922), p. 387.

²⁸⁵ Hatfield (1990), p. 17 [boldface added]. The term 'methodological naturalism' was allegedly coined by Paul de Vries, in an article from 1986, although it was not meant to denote the naturalization of the mind that is at stake in this chapter, but referred to natural scientific explanations of the world, i.e. those based on natural processes and events, as opposed to supernatural ones. As such, the idea of 'methodological naturalism' is still at the centre of debates pertaining to natural versus supernatural explanation in general, and evolutionism versus creationism in particular (see for example Poe & Mytyk, 2007 and Mahner, 2011). One of the apples of discord in these debates is the question of whether methodological naturalism automatically implies a commitment to metaphysical naturalism. Although the discussion of the manner in which methodological naturalism in for example Mill's and Helmholtz's theories of mind is paired with an explicit anti-metaphysical and anti-materialist stance might be relevant to those debates, the selective analysis of the history of methodological naturalism with regard to the mind in this chapter has little, if anything, to do with these current discussions, for two reasons. First of all, our research object is that of the mind and not the natural

Throughout the modern period and into the twentieth century, the major attempts to ‘naturalize’ the mind can be divided into materialistic and nonmaterialistic variants. Both share the goal of investigating and explaining mental processes with the methods of the natural sciences and, in particular, with methods and modes of explanation modeled after physics. Materialists propose that the naturalization requires that the mind be reduced to a material or physical system; I shall call their position ‘metaphysical naturalism’. **Nonmaterialist versions of naturalism are defined by the attempt to discover ‘natural’ laws of the mind, where ‘natural’ is cashed out through an analogy with the methods and modes of explanation in natural science, instead of by an appeal to ontology. I shall call this version ‘methodological naturalism’.** Associative accounts of the mind, which reduce mental processes to simple elements governed by a few laws – where these elements and laws are described as mental phenomena and are not identified with physical processes – have provided the typical example of what I term methodological naturalism. [...] Both Hume and Helmholtz pursued methodological naturalistic projects.

In other words, while the methodological foundation of empiricism with regard to the mind is determined in accordance with the method of the natural sciences, this does not in the least amount to a metaphysical assimilation of mental and natural phenomena and processes, or materialism.²⁸⁶ It is an approach to the mind that understands itself “by analogy to the natural sciences,” without, however, being founded in a metaphysical reductionism of mind and matter.²⁸⁷ In short: in this chapter, the term empiricism is used to denote those approaches that treat the mind *as if* it were a natural entity, without metaphysically assimilating the mental and the natural realm. In light of Helmholtz’s non-reductionist stance with regard to the mind, it is of utmost

world. Hence, the main question to be answered is that of the extent to which the mind can be treated *as if* it were a natural entity, governed by (and reducible to) its very own set of empirical laws. Secondly, methodologically naturalist explanations, in this context, are not opposed to supernatural modes of explanation, but to normative ones, as Hatfield (1990, p. 17-18) suggests: “Advocates of [...] naturalism have held differing opinions about whether naturalistic description is consistent with [...] normativity.” Again, Hatfield (*ibid.*, p. 17) distinguishes between a metaphysical and a methodological version of normativity with regard to the mind: “Among authors who conceived thought as irreducibly normative,” he writes, “some hold that the mind is normative in its essence [...]. Others who held that thought is essentially normative eschewed metaphysics. [...] They insist that thought must be investigated ‘philosophically,’ through the analysis, interpretation and criticism of our cognitive practices and of the concepts through which we describe such practices.”

²⁸⁶ For a recent discussion of the way in which methodological and metaphysical naturalism did not mutually implicate each other in early psychological theories, see McDonald (2008).

²⁸⁷ Gadamer (2006 [1975]), p. 3.

importance to clearly define the limits and scope of his psychological empiricism or methodological naturalism, and distinguish it from metaphysical naturalism.²⁸⁸

First and foremost, methodological naturalism refers to a *specific mode of psychological explanation*, that envisions an *a posteriori, constructive* account of mental phenomena, or, as Kant would have it, a physiology of understanding.²⁸⁹ More particularly, empiricism, in this sense, strives for an *atomistic* and *associationist* explanation of mental phenomena, i.e. (i) a reduction of complex mental phenomena to basic elements or indivisibles, and (ii) a subsequent reconstruction of mental contents as the associative compounds of these basic indivisibles.²⁹⁰ With regard to the psychological problem of the object, this entails an analysis of the notion of ‘the thing’ as a *de facto* complex mental construct, with a formative history in the mind that can be fully accounted for in terms of the lawful associative combination of elementary sensations.

Additionally, the naturalistic projects that we will discuss in this chapter accept the basic scientific precept of experimentation and observation as the most important instrument of knowledge production. However, it will soon become clear that in the context of their psychological investigation, this allegiance to empirical practice is merely an allegiance *in principle*. That is to say, none of the proto-psychological projects discussed below even come close to an experimental psychology properly so called, but instead they rely heavily on introspection and self-observation as a consequence of the intrinsic difficulties related to their research object (the mind).²⁹¹ Therefore, the term ‘empiricism’ in the following chapters refers mainly to an explanatory framework for mental phenomena.

²⁸⁸ The significance of this distinction is illustrated by Helmholtz’s firm rejection of metaphysical materialism, and psychological reductionism, as discussed extensively in the previous chapter.

²⁸⁹ See Rorty (1979), p. 126: “The idea was to offer a para-mechanical account of mental processes which, somehow, would underwrite some claims to knowledge and disallow other claims. The paradigm of the ‘epistemological turn’ taken by philosophy in the seventeenth century was what Kant called ‘the physiology of the human understanding.’” Although John Locke’s 1690 *Essay concerning Human Understanding* can be rightly identified as one of the founding fathers of this ‘epistemological turn’, its full-blown articulation is found in the work of David Hume. The latter’s radicalization of Lockean philosophy of mind therefore provides one of the most epochal and intriguing testimonies of the reconfiguration of the philosophical landscape throughout the seventeenth and eighteenth centuries.

²⁹⁰ Deleuze (1991 [1953]).

²⁹¹ Helmholtz noted that the psychological part of this physiology necessarily has to take recourse mainly to self-observation, given the generic differences between natural (external) and mental (internal) phenomena. See for example Helmholtz (1995 [1862], 1896). In contrast to his physical and physiological investigations, the psychological part of Helmholtz’s physiology is not embedded in an elaborate experimental practice. One could point to Fechner as the real founder of experimental psychology, who introduced the idea of mental measurement in his psychophysical research on sensation (see for example Boring, 1950).

One of the first clear articulations of the ‘science’ of man thus conceived, is to be found in David Hume’s *Treatise of Human Nature*, due to which Hume can be considered as the ‘arch psychological philosopher’, to use Robinson’s terms.²⁹² This early methodological naturalism was then further elaborated in the sixth book of John Stuart Mill’s *A System of Logic*, entitled *On the Logic of the Moral Sciences*.²⁹³ As such, this chapter will devote considerable attention to the work of both authors, specifically with regard to the psychological problem of the object, as they can be considered as precursors to the empiricist dimension of Helmholtz’s psychology of the object.

3.1.2 Helmholtz, Empiricism and Pure Psychology

Based on this general description of empiricism, Hatfield (1990) was quite right in putting Helmholtz on a par with Hume and Mill. As early as 1862, Helmholtz stated that the *Geisteswissenschaften* [moral sciences] “have something to learn” from the natural and physical sciences “in point of method.”²⁹⁴ In what he calls the ‘psychological part of his physiology’, a psychological, genetic account of the object is put forward, in which the latter is conceived of as a complex mental phenomenon, produced by the learned association between underdetermined sensation-signs and their meaning-objects. The empirical theory, Helmholtz specifies, considers “memory, experience and custom” as “facts, whose laws are to be sought, and which are not to be explained away because they cannot be [...] referred to the known laws of nervous excitation.”²⁹⁵ In describing his empirical position, Helmholtz thus again seizes the opportunity to reassert the autonomy of psychological investigation *vis-à-vis* physiology.

Some interpretative difficulties arise, however, from Helmholtz’s denial that methodological naturalism can ever be helpful in producing a pure psychology, i.e. a meta-theoretical framework with regard to the nature and structure of psychological activity, considered in abstraction of its empirical content. In the introduction to his *Treatise*, he writes that²⁹⁶

²⁹² Robinson (1986), p. 234; Hume (1969 [1739/1740]); Mill (1882 [1843]).

²⁹³ It is important to note that Mill did not explicitly refer to Hume in constructing his psychology of the object. However, the programmatic similarity between both is striking, as will be discussed further on in this chapter.

²⁹⁴ Helmholtz (1995 [1862]), p. 90.

²⁹⁵ Helmholtz (1896 [1877a]), p. 187.

²⁹⁶ Helmholtz (1867 [1856/1866], III), p. 427-428 [my translation]; Helmholtz (1896, III), p. 577 [boldface added].

The discovery and description of [...] psychological activity will not be [...] an essential part of the present investigation, as in this area of study, we cannot rely on [...] ascertained facts and methods founded in clear, generally accepted principles. Thus [...] I think the psychological domain of physiology [...] should be kept separate from pure psychology, whose task it is to establish [...] the laws and nature of psychological activity [Seelenthätigkeiten]. **Still, one cannot avoid altogether** talking of mental processes [...], in attempting to establish a clear connection between phenomena, instead of summing up the unconnected facts [...]. And yet we know [...] that people very rarely agree upon these abstract questions, and that the keenest thinkers, such as Kant, have long ago analyzed and demonstrated these relations correctly, without thereby producing a permanent and general agreement about them [...]. **I shall endeavor to avoid** all reference to opinions as to mental activity, as involving questions that always have been, and perhaps always will be, subjects of debate between the various philosophical schools.

Although this paragraph confronts us with a number of difficulties with regard to Helmholtz's psychological position, it raises two questions in particular, namely (1) the question as to what 'pure psychology' means exactly, and (2) the apparent contradiction between Helmholtz's self-proclaimed attempt to avoid pure psychological matters, and his assertion that they are at the same time unavoidable in the context of his theorizing. From both these issues some important clues can be derived with regard to the scope and limits of Helmholtz's empiricism.

First, what is meant by 'pure psychology', in contradistinction to 'the psychological part of physiology'? Helmholtz's reference to Kant is very telling in this respect, as it is indicative for the entanglement of (pure) psychology, philosophy and (critical) epistemology in his work. From other passages it is clear that pure psychology, for Helmholtz, does not simply refer to theoretical (as opposed to applied) psychology, but to a philosophical project that Helmholtz finds represented prototypically in Kant's *Critiques*. "Philosophy, if it gives up metaphysics," Helmholtz writes in 1877, "still possesses a wide and important field, the knowledge of mental and spiritual processes and their laws."²⁹⁷ In a lecture the following year, Helmholtz adds that philosophy, *in contrast to natural science*, which concentrates on the material content of knowledge, considers "the intellectual side" of knowledge, i.e. "that which belongs to the mind's own activity."²⁹⁸ In short, the task of pure philosophy is to investigate mental processes,

²⁹⁷ Helmholtz (1995 [1877a]), p. 325.

²⁹⁸ Helmholtz (1995 [1878b]), p. 344: "Philosophy [...] considers the intellectual side, seeks to exclude from our knowledge and ideas that which originates from the influences of the corporeal world in order to be able to

which are the beginning and basis of knowledge and action.²⁹⁹ As such, it aligns with “Kantian philosophy, that aimed at [...] investigating the sources of knowledge and the degree of their justification.”³⁰⁰ The distinction between pure psychology and the psychological part of the physiology of sense perception, with the former belonging to philosophy and the latter to the natural sciences, thus suggests that Helmholtz’s methodological naturalism does not necessarily imply a full-blown empiricist metatheory with regard to the mind as a *tabula rasa*, i.e. a generalized perspective on mental phenomena as entirely reducible to associative complexes of sensations, with the exclusion of ‘the form of representation’.³⁰¹

Secondly, in the paragraph quoted above, Helmholtz expresses his (quite troubling) aspiration of avoiding the unavoidable: reference to principles of pure psychology in the psychological part of his physiology. With regard to the central problem of this dissertation, this means that while Helmholtz’s psychology of the object cannot avoid reference to metatheoretical principles, he refuses to commit to one single position in this respect. We might hypothesize that this is precisely the point where Helmholtz will take the liberty to ‘waver’ between empiricism and critical philosophy.³⁰² This difficulty has led some to read Helmholtz as a bad and/or inconsequent philosopher, while others maintain that he is dovetailing or wavering between philosophical positions, while still others attempt to pin him down to one definite position (either empiricism or

state that which belongs to the mind’s own activity. Natural science, by contrast, [...] seeks to divide off that which is definition, designation, form of representation, and hypothesis in order to retain as pure residue that which belongs to the world of reality, whose laws it seeks.”

²⁹⁹ Helmholtz (1995 [1868]): “[A]pprehension by the senses supplies after all, [...] the material of all human knowledge, [...]. It supplies the basis for the whole of action of man upon the outer world; and if this stage of mental processes is admitted to be the simplest and lowest of its kind, it is none the less important and interesting. For there is little hope that he who does not begin at the beginning of knowledge will ever arrive at its end.”

³⁰⁰ Helmholtz (1896 [1855]), p. 88 [my translation]; also see Helmholtz (1896 [1874]), p. 433.

³⁰¹ This contradicts Singh’s 1991 reading of Helmholtz’s psychology as being a product of the Lockean *tabula rasa* view of the mind. Although this chapter aims to demonstrate that Helmholtz indeed attempted to account for the genesis of the notion of thinghood in terms of an empirical construction based on learning and experience as much as possible, it will become clear that this does not at all imply a rejection of Kant’s philosophy, as Singh claims. As will be demonstrated, the limits of methodological naturalism do not at all coincide with the boundaries of Helmholtz’s perception theory, which also includes other levels of analysis in line with Kantian and Fichtean epistemology. Hence, it is quite problematic to ascribe to Helmholtz a metatheoretical view of the mind as a *tabula rasa*.

³⁰² That is, critical philosophy as Helmholtz understands it, i.e. as a pure psychology. With regard to the problem of the object, the metatheoretical view implied in the latter can be articulated as the thesis that the idea of thinghood is not just an *a posteriori* construct, but a function of *a priori* synthetic principles of the mind. In this respect (see chapters 4 and 5).

transcendentalism).³⁰³ This is, however, not the perspective taken in this dissertation, that argues for the systematic relation of all these different metatheoretical perspectives with regard to the psychological problem of the object.

3.1.3 Overview of the chapter

To address the questions sketched in this introduction, this chapter will go into:

- (1) David Hume's naturalist project with regard to the mind in general (section 3.2), and his empiricist account of the perceptual object in particular, as presented in his *A Treatise of Human Nature* (sections 3.2.1 and 3.2.2).
- (2) Hume's difficulties with constructing a satisfactory account of the self or subject based on his empiricist framework (section 3.3).
- (3) The common-sense opposition to Hume's 'New Scene of Thought' with regard to the mind and experience (section 3.4).
- (4) John Stuart Mill's reuptake of the Humean perspective on objectification (section 3.5 and 3.5.1), and the way in which this reuptake lead to a revival of the empiricist problem of the self (section 3.5.2).
- (5) The empirical dimension of Helmholtz's theory of the object, and the way in which it can be understood against the background of Hume's and Mill's psychological project (section 3.6 and 3.6.1).
- (6) The problem of subjectivity, and the way in which it provides Helmholtz with a motive for shifting towards the German transcendental tradition in his psychology of the object (section 3.6.2).

3.2 Hume's New Scene of Thought

The rise of methodological naturalism with regard to the mind should be understood against the intellectual background of a philosophy "intent on showing that whereas

³⁰³ Coffa (1991) mentions Hermann Cohen as one of the people who regarded Helmholtz's work to be bad philosophy. Also Lenin (1971 [1925]), for example, was not so sympathetic towards Helmholtz as a philosopher. As already mentioned, the 'dovetailing' view can be found in a number of authors. One-sided readings of Helmholtz as an empiricist are presented by Boring (1950), Hochberg (2007), Singh (1991). Heidelberger (1993, 1994), in contrast, has a tendency to stress the idealist dimension of Helmholtz's work.

Newton had shown that there could be a natural philosophy of the external world, [...] there could be a natural philosophy of the internal world.”³⁰⁴ In the endeavor to naturalize the mind, the publication of Hume’s *Treatise* constituted an epochal event. Hume’s methodology was groundbreaking. The analysis he envisioned was by all means a *scientific* one (as opposed to mere speculation). More particularly, Hume aimed at an account of human nature that aligned with the Newtonian ideal of the natural sciences, and hence took as its first principle the latter’s credo “Hypotheses non fingo [I feign no hypotheses].”³⁰⁵

In a 1734 pre-*Treatise* ‘Letter to a Physician’, David Hume, at the time a young philosopher in his early twenties, famously declared that “a new scene of thought” had opened up for him, or a “new medium, by which truth might be established.”³⁰⁶ This so-called new scene pertained to the science of human nature, for which Hume was to lay the foundations a few years later in his *Treatise of Human Nature*.³⁰⁷ From Hume’s work, it is clear that he considered this study to be not only the *philosophia prima* of all philosophy, but more importantly, of all the sciences, as he was strongly convinced that “all the sciences have a relation, greater or less, to human nature [...] since they lie under the cognizance of men, and are judged of by their powers and faculties.”³⁰⁸ Consequently, the Scottish philosopher conceived of the science of human nature – which subsequently analyzes the faculty of understanding (book I), the human passions (book II), and morality (book III) – as an indispensable component of the inquiry into the nature of human knowledge. In the context of this discussion, we are exclusively

³⁰⁴ Martin & Barresi (2006), p. 141.

³⁰⁵ Johnson (1995), p. 22. The exact manner in which Hume was indebted to Newton’s ideal of science is a topic of ongoing debate. In his seminal analysis of Hume’s work, Kemp Smith claims that “Newton’s conception of method [...] is precisely the method which Hume claims to be following in his own thinking.” (Kemp Smith, 1966, p. 57). To illustrate this point, Kemp Smith refers to the following passage in Newton’s *Opticks*: “Investigation of difficult Things by the Method of Analysis, ought ever to precede the Method of Composition. This analysis consists in making Experiments and Observations, and in drawing general Conclusions from them by Induction, and admitting of no Objections against the Conclusions, but such as are taken from Experiments of other certain Truths. For Hypotheses are not to be regarded in experimental Philosophy.” (Newton, 1704, as quoted in Kemp Smith, 1966, p. 56). Martin & Barresi’s (2006) and Demeter’s (2012) work illustrates that this is still a fashionable interpretation of Hume’s work. Other scholars, such as Jones (1982) and McIntyre (1994), for example, have doubted Hume’s explicit allegiance to Newton on the basis of a lack of textual evidence. In itself this discussion is beyond the scope of the present analysis, although it might provide a clearer insight into the first steps that were undertaken to establish a scientific approach to the mind, and the way in which this new approach drew inspiration from the methodology used in the natural sciences. For some accounts of the way in which Hume was indebted to Newton in constructing his Science of Human Nature, see among others Johnson (1995), Biro (1993) and Demeter (2012).

³⁰⁶ Hume as quoted in Burton (1846), p. 31.

³⁰⁷ Hume (1969 [1739/40]).

³⁰⁸ Hume (1969 [1739/40]), p. 42.

interested in the first book of Hume's *Treatise*, entitled *Of the Understanding*, which presents an in-depth analysis of the cognitive faculty.

In the introduction to his *Treatise*, the Scottish philosopher summarized his methodological point of departure as follows:³⁰⁹

[A]s the science of man is the only solid foundation for the other sciences, so the only solid foundation we can give to this science itself must be laid on experience and observation. [...] And tho' we must endeavor to render all our principles as universal as possible, by tracing up our experiments to the utmost, and explaining all effects from the simplest and fewest causes, 'tis still certain we cannot go beyond experience; and any hypothesis, that pretends to discover the ultimate original qualities of human nature, ought at first to be rejected as presumptuous and chimerical.

In accordance with this general methodological starting point, Hume gave his *Treatise* the subtitle *An Attempt to introduce the experimental Method of Reasoning into Moral Subjects*.³¹⁰ The author's ambition in his book *Of the Understanding* can be described most generally as an attempt to "anatomize" the mind, i.e. to decompose mental phenomena into more primitive elements (impressions and ideas), and reconstruct their formative history in the mind by means of a minimal amount of mental laws.³¹¹ With the latter, Hume had in mind the laws of association, more specifically those of resemblance, contiguity and causality, which, not unlike Newton's laws of motion, would provide a sufficient explanation for the way in which our most fundamental beliefs about the world are generated from basic impressions.³¹² Hume, however, was well aware of the opaque nature of his main research interest, the human mind, and the insurmountable difficulties this created with regard to the method of experiment and observation, which, in the case of the human mind, could amount to no more than "the cautious observation of human life."³¹³ He was quite optimistic, however, that from this 'cautious observation' an empirically informed system of the mind could be derived.

³⁰⁹ Hume (1969 [1739/40]), p. 43-44.

³¹⁰ Hume (1969 [1739/40]).

³¹¹ Hume frequently described his project in terms of an 'anatomy' of human nature, as if it were to underline the non-speculative and systematic nature of his endeavour. See for example Hume (1938 [1740]), p. 6 and Hume (1969 [1739/40]), p. 311.

³¹² Hume (1969 [1739/40]), p. 58; Harré (2002), p. 72.

³¹³ Hume (1969 [1739/40]), p. 45-46: "Moral philosophy has, indeed, this peculiar disadvantage, which is not found in natural, that in collecting its experiments, it cannot make them purposely, with premeditation, and after such a manner as to satisfy itself concerning every particular difficulty which may arise [...]. We must therefore glean up our experiments in this science from a cautious observation of human life, and take them

In its attempts to construct a science of man, and more particularly a science of mind, continuous with the natural sciences, the *Treatise* actually provides the prototypical example of what we have called in the introduction to this chapter ‘methodological naturalism with regard to the mind’. More importantly, the Scottish philosopher’s work provides a primal example of how the psychological problem of the object is treated in a strictly empiricist framework.³¹⁴ In what follows, Hume’s general project of a science of human nature will therefore be further explored, by focusing specifically on the way in which he addresses the problem of the object and objectification. To that end, we will focus on the section *Of scepticism with regard to the senses* in the *Treatise* (§ I.4.ii), which investigates the nature and origin of the belief in the object as a continued and distinct existence.³¹⁵ In accordance with Kemp Smith’s and Barry Stroud’s influential interpretations of Hume’s work, the following discussion distinguishes between a positive, naturalistic moment in Hume’s philosophical analysis (pertaining to the origin of the belief in externality) and a negative, sceptical one (pertaining to the justification or ground of the latter).³¹⁶ As the discussion of Hume in this context ultimately aims to provide a historically informed insight in Helmholtz’s psychology of the object, we will especially focus on Hume’s work as presenting a naturalized account of our most basic beliefs.³¹⁷

as they appear in the common course of the world [...]. Where experiments of this kind are judiciously collected and compared, we may hope to establish on them a science [...].”

³¹⁴ For the centrality of the problem of the object in Hume’s philosophy, see the recent monograph on the matter by Rocknack (2013).

³¹⁵ Hume (1969 [1739/40]), p. 238-268.

³¹⁶ Kemp Smith (1966); Stroud (1977).

³¹⁷ I do acknowledge that both naturalism and scepticism are intrinsically related in Hume’s theorizing, and that this is considered by many as quite problematic. The entanglement, or, according to some, even confusion, between psychology and epistemology in Hume is, and has been, the topic of a vast amount of philosophical debate, and has been referred to as ‘the fallacy of psychologism’. As Maslow (1961) (in Jacquette, 2003, p. 251) describes: “[W]e find that in understanding certain logical principles we have to go through certain psychological experiences, and we conclude that the two are one and the same. [...]” The combination of a “normative assessment of the legitimacy of beliefs with a naturalistic account of the causes of belief” (Falkenstein, 1997, p. 30) has been considered to be delicate at the least, or even unsound, as it involves “proposing psychological solutions to philosophical problems” (Hatfield, 1990, p. 9; also see Rorty, 1979; Sellars, 1963). Although it is important to mention the interpretative problems with regard to Hume’s work, they will be suspended in what follows, in favour of an isolated treatment of Hume’s psychology of the object. We thereby focus on the ‘positive’ (naturalist) part of his theorizing. Although this discussion will automatically lead us to a brief consideration of Hume’s scepticism, this negative aspect of Hume’s work is not the main focus of this discussion.

3.2.1 Hume's Conception of the Problem of the Object in the *Treatise*

In the opening paragraph of *Of scepticism with regard to the senses*, Hume introduces the central question of this particular section of the *Treatise* as follows: “We may well ask, *What causes induce us to believe in the existence of body?* But ‘tis in vain to ask, *Whether there be body or not?*”³¹⁸ The foundational question of Hume’s psychology of the object is thus formulated as the problem of accounting for the causal origin and the formative history of the idea of *thinghood* in the mind, or the problem of accounting for the belief in a mind-independent object, that transcends the perceptual act as such.

Moreover, the metaphysical question concerning the reality of objects as such, is dismissed from the very onset. The motive for this dismissal can be traced back to the section *Of the idea of existence and of external existence* (§ 1.2.vi) in the *Treatise*, which unlocks the foundation of Hume’s philosophical position, and gives the clearest articulation of the *radical subjectivism* that founds his entire project.³¹⁹

[S]ince nothing is ever present to the mind but perception, and since all ideas are deriv’d from something antecedently present to the mind; it follows, that ‘tis impossible for us so much as to conceive or form an idea of any thing specifically different from ideas and impressions. [...] We never really advance a step beyond ourselves, nor can conceive any kind of existence, but those perceptions, which have appear’d in that narrow compass [...].

Hume’s psychological analysis thus takes for granted the radical fissure between knowing subjects and mind-independent reality, and even goes so far as to condemn the former to the realm of private experience and subjective feelings. For the Scottish philosopher, there is no hope of ever “advancing a step beyond” ourselves, and from this perspective, the interrogation of being-in-itself is utterly redundant.³²⁰ The metaphysical question is consequently set aside in favor of an inquiry into the genesis of the *belief in existence*, and the attempt to establish “the principles that force that opinion upon us.”³²¹ As such, Hume’s inquiry entails a suspension of what he calls the viewpoint of ‘vulgar’, everyday consciousness, that is naturally inclined “to consider objects strongly [...]”³²² The belief in existence, Hume adds, surely is a necessary, unavoidable part of experience, as “nature, by an absolute uncontrollable necessity has determin’d

³¹⁸ Hume (1969 [1739/40]), p. 238.

³¹⁹ Hume (1969 [1739/40]), p. 116; Anderson (1975).

³²⁰ Hume (1969 [1769/40]), p. 116.

³²¹ Robinson (1986), p. 233. Also see Rocknack (2013), p. 83: “He [Hume] takes it for granted that normally functioning human beings do believe in such things; the question is: *Why?*”

³²² Hume (1969 [1739/40]), p. 312.

us to judge as well as to breathe and feel.”³²³ Or, as he states in his *Enquiries*: a belief is “as unavoidable as to feel the passion of love [...] which no reasoning or process of thought and understanding is able either to produce or prevent.”³²⁴ The philosophical problem of the belief in external existence, Hume therefore adds, does not concern the belief in existence as “a matter of fact” and neither pertains to “*whether* the mind forms such a conclusion [...] but to [...] *the manner in which* the conclusion is form’d, and the principles from which it is deriv’d [...]”³²⁵

The first step to be taken in order to examine the origin of the belief in external existence within a Humean framework, is hence the emancipation of the (unavoidable and necessary) self-evidence in which one is immersed in everyday life. Contrary to the vulgar point of view, which commonly confounds objects and percepts, philosophical reflection starts with recognizing the fundamental difference between the (interrupted, transient) character of perception on the one hand, and, on the other, the continued, permanent nature of what we conceive of as *a thing*.³²⁶ This latter conception, Hume goes on to explain, can be further analyzed as implying (1) a belief in continued existence, and (2) a belief in distinct existence, with the latter being further specified as pertaining to (2a) external position or location, and (2b) mind-independency. The property of continuity, he adds, “is prior to that of its distinct existence and produces the latter principle”, meaning that once the belief in continued existence is established, the correlative notion of distinctness automatically and spontaneously follows.³²⁷ After suspending the vulgar viewpoint, Hume proceeds to present the various possible sources of the belief in externality (the senses, reason or imagination) and discusses them one by one to determine which gives rise to the idea of the object.

3.2.2 The Associative Genesis of the Belief in Thinghood

In his analysis of the psychological origin of the notion of (continued and distinct) existence, Hume spends by far the most attention to the hypothesis that it is given

³²³ Hume (1969 [1739/40]), p. 234.

³²⁴ Hume (1975 [1748]), p. 46.

³²⁵ Hume (1969 [1739/40]), p. 256.

³²⁶ Hume (1969 [1739/40]), p. 259-260.

³²⁷ Hume (1969 [1739/40]), p. 249. Also see Hume (1969 [1739/40]), p. 260: “[T]here is an intimate connexion betwixt those two principles, of a continu’d and of a distinct or independent existence, and that we no sooner establish the one than the other follows, as a necessary consequence. ‘Tis the opinion of a continu’d existence, which first takes place, and without much study or reflection draws the other along with it, wherever the mind follows its first and most natural tendency.”

immediately with sensation, and is hence a product of sensibility.³²⁸ The assumption that a belief in *continued* existence is given on the level of the senses, however, is quickly dismissed by him as absurd, as it would imply a *contradictio in terminis*. After all, how can the belief that the thing exists independently from sensibility be itself a product of sensibility?³²⁹ But does this also apply to the notion of ‘distinctness’?

The sensible presentation of *thinghood* as distinct existence, Hume goes on to explain, would imply that sensory information is received immediately as ‘being distinct from the self’. Hence, this hypothesis would only be a viable one, if the notion of the self is given at an equally primitive level of sensory experience:³³⁰

[I]f the senses presented our impressions as external to, and independent of ourselves, both the objects and ourselves must be obvious to our senses, otherwise they cou’d not be compar’d by these faculties. The difficulty, then, is how far we are ourselves the objects of our senses.

In other words, Hume argues that *the thing* cannot present itself directly in a relation of the form “to be independent of ...” or “to be external to ...” if there was not already a self there, that it could possibly be independent of.³³¹ In accordance with his empirical point of view, that prescribes that every mental content is somehow derived from sensibility, Hume is forced to assume that the presentation of the self *to itself*, would likewise have a sensible origin. Already at this point in his discussion, Hume stumbles on the problem of the subject in trying to address the problem of the object. We will come back to this point in section 3.3. For now, it suffices to point out that the (origin of) the notion of a self for Hume is at least as problematic as that of thinghood, and, consequently, he denies that it could provide a sufficiently stable basis for an immediate sensible presentation of things as *distinct* existences.

As a further argument against the direct sensible presentation of things as distinct (external and independent) existences, Hume argues that there is no *inherent* difference between impressions generated internally and those with an external origin. With regard to the manner in which they appear in sensible experience: “[E]very impression,

³²⁸ In what follows, only the central arguments of Hume’s exposition will be outlined, while other, rather trivial considerations will be left aside. Besides the relevant passages in the *Treatise*, this reconstruction was guided especially by Kail (2007), p. 14-17, Allison (2008), p. 230-258, and Rocknak (2013).

³²⁹ Hume (1969 [1739/40]), p. 239.

³³⁰ Hume (1969 [1739/40]), p. 240.

³³¹ Allison (2008), p. 233. Rocknak (2013, p. 86) aptly reconstructs this argument as follows: “If we apprehend an impression as distinct (and so, as external and independent) we would have to be able to distinguish between ourselves and impressions solely by means of impressions. [...] But we do not, by way of the senses alone, apprehend ourselves as distinct, external or independent. Thus, sensing alone cannot grant us apprehension of the property of distinctiveness, externality or independence.”

external and internal, is originally on the same footing,³³² and they are all conditioned in a like manner by “our organs, and the disposition of our nerves.”³³³ Hume thus denies (contra Locke) that there is any inherent difference between the three classes of perceptions, i.e. primary (“figure, bulk, motion, and solidity”), secondary qualities of impressions (“colours, tastes, smells, sounds, heat and cold”), and internal impressions such as pain and pleasure as regards their mode of existence:³³⁴

[C]olours, sounds, heat and cold, as far as appears to the senses, exist after the same manner with motion and solidity [...]. Colours, sounds etc. are originally on the same footing with the pain that arises from steel, and pleasure that proceeds from a fire; [...] For as they are confess to be [...] nothing but perceptions arising from the particular configurations and motions of the parts of body, wherein possibly can their difference consist? [...] [W]e may conclude [...] all perceptions are the same in the manner of their existence.

In conclusion, Hume decides that “the opinion of a continu’d and of a distinct existence never arises from the senses.”³³⁵

The remaining candidates to be considered as the source of the belief are then those of (logical) reason and imagination. The former hypothesis, i.e. that the belief in thinghood in everyday life is somehow generated by reason, is refuted by Hume in one single paragraph. While one could argue that a philosopher would possess the intellectual skills needed to *reason* himself into the external world, Hume argues, it would be absurd to presume that “children, peasants, and the greatest part of mankind” would derive their most ordinary beliefs through complex forms of logical reasoning.³³⁶ Therefore, He concludes, the belief in external existence, is as “unreasonable” as it is necessary and unavoidable.³³⁷ It is not sensibility, nor reason, but imagination that “is seduc’d into such an opinion.”³³⁸

Hume’s demonstration of the imaginative origin of the belief of thinghood starts from the following hypothesis:³³⁹

Since all impressions are internal and perishing existences, and appear as such, the notion of their distinct and continu’d existence must arise from a concurrence

³³² Hume (1969 [1739/40]), p. 240.

³³³ Hume (1969 [1739/40]), p. 260.

³³⁴ Hume (1969 [1739/40]), p. 242-243.

³³⁵ Hume (1969 [1739/40]), p. 242.

³³⁶ Hume (1969 [1739/40]), p. 243.

³³⁷ Hume (1969 [1739/40]), p. 244.

³³⁸ Hume (1969 [1739/40]), p. 259.

³³⁹ Hume (1969 [1739/40]), p. 244.

of some of their qualities with the qualities of the imagination. [...] 'Twill therefore be easy for us to discover these qualities by a comparison of the impression, to which we attribute a distinct and continu'd existence, with those, which we regard as internal and perishing.

In other words, Hume hypothesizes that there is something qualitatively different about the manner in which impressions with an external origin succeed one another, in contrast to those that are internally generated. By virtue of this difference in appearance, essentially disparate impressions can be associatively linked in imagination as to give rise to the notion of a thing. In accordance with this basic hypothesis, the Scottish philosopher now has to find a quality (or qualities) that characterizes the succession of those impressions associated with external objects, and which cannot be found in those that are internally generated.

Upon analysis, Hume argues, we find that impressions associated with the idea of thinghood, in contrast to those that are generated internally, are *constant* and *coherent* in their appearance. More particularly, some impressions succeed one another in a uniform manner, while others are prone to fluctuate under the influence of subjective modifications (e.g. mental state, interrupted perception, and so on). Consequently, imagination will bind only the uniform impressions together by means of the principle of *constancy*.³⁴⁰ However, this principle in itself does not suffice to give rise to the belief in continued existence, as there is a certain amount of variability possible. The object can move (change of place), its surroundings may alter, etc. Therefore, Hume adds a second principle, namely that of *coherence*, which states that impressions related to external objects present themselves in a coherent manner, notwithstanding their variability in space and time. This is illustrated as follows:³⁴¹

[W]hen I return to my chamber after an hour's absence, I find not my fire in the same situation, in which I left it: But then I am accustom'd in other instances to see a like alteration produc'd in a like time, whether I am present or absent, near or remote.

So the qualities of constancy and coherence of certain (groups of) impressions are said to give rise to the complex associative belief in *continued* existence. Given the primacy of the notion of continuity over distinctness (see section 3.2.1), this automatically evokes the idea of *distinct* existence. In conclusion, these two principles

³⁴⁰ Hume (1969 [1739/40], p. 245) illustrates the principle of constancy as follows: "[T]hese mountains, and houses and trees, which lie at present under my eye, have always appear'd to me in the same order; and when I lose sight of them by shutting my eyes or turning my head, I soon after find them return upon me without the least alteration."

³⁴¹ Hume (1969 [1739/40]), p. 245.

and the mental mechanics of imagination by which they are united suffice to account for the origin of the belief in an enduring, permanent world of mind-independent objects.

This is as far as the ‘naturalistic’, or positive moment in Hume’s analysis is concerned. With respect to the possibility of ever rationally justifying the belief in external objects, Hume is less optimistic, and his psychologistic line of reason tilts into scepticism. The ascription of continued existence, he states, is “an error,” and he concludes his analysis by stating that he is more inclined to “repose no faith at all in my senses, or [...] imagination,” and that the notion of the external is in fact nothing more than a “gross illusion.”³⁴² It is indeed “a short way” from psychologism to scepticism in Humean philosophy: Hume’s psychological analysis prompts him to conclude that the notion of the object is entirely imaginative, and hence, cannot be justified by reason.³⁴³ The notion of the object is nothing more than a projected figment of the subject’s imagination; a subject that remains forever condemned to the confined universe of imagination, and cannot ‘advance a step’ beyond itself.³⁴⁴ Hume’s sceptical conclusion, however, by no means prevents him from maintaining that the strength of vulgar beliefs is in fact indestructible. Hume maintains that even those who are convinced by his argumentation will rapidly drop all sceptical doubt and return to the vulgar opinion that there is an internal and an external world.³⁴⁵ No sceptical argument is strong enough to destroy ‘natural’ beliefs, he argues, and even sceptics³⁴⁶

[...] will be the first to join in the laugh against himself, and [...] can have no other tendency than to show the whimsical condition of mankind, who must act, and reason and believe; though they are not able, by their most diligent enquiry, to satisfy themselves concerning the foundation of these operations, or to remove the objections, which may be raised against them.

The sceptic in Humean philosophy thus puts himself in the rather peculiar position to have to accept two independent and even conflicting systems of thought: that of the vulgar and that of philosophy.³⁴⁷

Hume’s naturalistic psychology of the object, however, faces serious, if not fatal, problems, which would soon come under the scrutiny of German philosophers like Kant but which would likewise provide an important motive for the rise of common-sense

³⁴²Hume (1969 [1739/40]), p. 267.

³⁴³Waxman (1994), p. 12.

³⁴⁴Hume (1969 [1739/40]), p. 116.

³⁴⁵Hume (1969 [1739/40]), p. 268.

³⁴⁶Hume (1975 [1749]), p. 160.

³⁴⁷Strawson (2008 [1975]), p. 10.

philosophy. These problems are related to Hume's inability to account for the active, unitary subject that is implied in his associationist psychology of the object.

3.3 Hume's Labyrinth: The Aporetic Corners of the Science of Human Nature

Before concluding this discussion of Hume's account of the genesis of the belief in externality, we return to the manner in which the problem of the notion of the external is entangled with the problem of the self in the *Treatise*. As noted, Hume dismisses the idea of an unmediated sensible presentation of objects as continued and distinct existences, since this would require, according to him, that there is a similar direct presentation of the self at the level of sensibility:³⁴⁸

[I]f the senses presented our impressions as external to, and independent of ourselves, both the objects and ourselves must be obvious to our senses, otherwise they cou'd not be compar'd by these faculties. The difficulty, then, **is how far we are ourselves the objects of our senses**. 'Tis certain there is no question in philosophy more abstruse than that concerning identity, and the nature **of the uniting principle, which constitutes a person**. [...] [W]e must have recourse to the most profound metaphysics to give a satisfactory answer to it [...]. 'Tis absurd, therefore, to imagine the senses can ever distinguish betwixt ourselves and external objects.

Although Hume touches only briefly upon the problem of the self in the context of his naturalized psychology of the object, it is the central question of the section *Of personal identity* (§ I.4.iv), which is a continuation of the discussion initiated in *Of the immateriality of the soul* (§ I.4.v).³⁴⁹ First and foremost, the paragraph on personal identity aims to discredit metaphysical, substantialist views of the self, by demonstrating that the idea of personal identity is nothing more than an imaginative, *a posteriori* (and thus illusory) construct, just like the idea of the external existence.³⁵⁰ Although he refers to the self as a *uniting principle* in the above quote, it is articulated as a *mental content* (a

³⁴⁸ Hume (1969 [1739/40]), p. 240 [boldface added].

³⁴⁹ Hume (1969 [1739/40]), p. 280-311.

³⁵⁰ Hume (1969 [1739/40]), p. 280-299. For a recent overview of scholarly discussions on Hume's account of the self, see Rocknak (2013), 189-218.

belief) in the discussion on personal identity. This peculiar change of perspective, from the self as a uniting principle to a mental content, allows Hume to subject the problem to the same naturalistic procedure of decomposition employed in his analysis of the belief in existence, as we will see below. The most interesting thing about the section on personal identity, however, is that Hume later considered it an utter failure, and famously retracted it in an *Appendix* added in 1740. In this appendix, Hume stated that he is now convinced that his naturalized account of the self is “very defective.”³⁵¹ Furthermore, he desperately added that he found himself “involv’d in such a labyrinth,” neither knowing “how to correct” his former opinions, “nor how to render them consistent.”³⁵² So let us take a look at the Hume’s ‘labyrinth’, and, more importantly, at the way in which it relates to (and affects) his psychological account of the object.

First, let us consider the motive for the peculiar shift in discourse about the self, from mental principle to mental content, that takes place between sections I.4.ii and I.4.iv. As already noted, this allows Hume to assimilate the problem of the self to that of the object, and approach both by means of the same procedure. Just like he had reduced the belief in thinghood to an imaginative compound rooted in sensible impressions, he now sets out to do the same with the notion of the self. The main question thus becomes:³⁵³

[F]rom what impression cou’d this idea [i.e. of the self] be deriv’d? This question ‘tis impossible to answer without a manifest contradiction and absurdity; and yet ‘tis a question, which must necessarily be answer’d if we wou’d have the idea of self pass for clear and intelligible. It must be some one impression, that gives rise to every real idea. But self or person is not any one impression, but that to which our several impressions and ideas are suppos’d to have a reference.

Hume’s methodological framework prescribed that for an idea to be valid (or ‘clear and intelligible’), it has to be reduced to (a combination of) impressions. So to put it bluntly, Hume’s naturalistic point of departure simply cannot handle the question of the self *qua* uniting principle. Yet, he immediately adds, to search for the origin of the idea of the self in sensibility, begs for contradiction and absurdity, as the self is not *in* sensibility, but that to which the whole of sensibility relates. Already at this point, one can hardly fail to notice the seeds of Hume’s later puzzlement in the *Appendix*. But let us first take a brief look at what the sceptic’s naturalistic analysis of the self amounts to.

³⁵¹ Hume (1969 [1739/40]), p. 677.

³⁵² Hume (1969 [1739/40]), p. 675.

³⁵³ *Ibid.* p. 300.

Of personal identity begins with a suspension of the metaphysical question concerning the self-in-itself, in a like manner as Hume had introduced his analysis of the object by putting the object-in-itself beyond the horizon of possible knowledge.³⁵⁴ Subsequently, Hume goes on to explore the psychological origin of the belief in a self as continued and distinct existence. As the intelligibility of the notion of the self hinges on the extent to which the concept can be derived from sensible experience, Hume resorts to a quasi-observational, introspective strategy in order to pinpoint the basic sensible elements from which this belief might emerge. But in entering “most intimately into what I call myself,” the philosopher goes on to explain³⁵⁵

[...] I always stumble on some particular perception or other [...] **I never can catch myself at any time** [...] never can observe any thing but the perception [...] **The mind is a kind of theatre**, where several perceptions [...] make their appearance; pass, re-pass, glide away, and mingle [...] There is properly no simplicity in it at one time, nor identity [...].

Here Hume arrives at what is now known as his ‘bundle theory’, which states that the notion of the self refers to “a heap or collection of different perceptions [...] falsely [...] endow’d with a perfect simplicity and identity.”³⁵⁶ Ultimately, Hume concludes that we call a ‘self’ is “nothing but a bundle or collection of different perceptions, which succeed each other with an inconceivable rapidity, and are in a perpetual flux and movement.”³⁵⁷ In the end, Hume’s introspective strategy thus compels him to accept a notion of the self that is, as William James would later remark, the perfect opposite of the substantialist view of the self (as “nothing but unity, [...] abstract and absolute”), i.e. an *infinite diversity*.³⁵⁸ In itself, Hume’s bundle theory is a systematic implementation of methodological naturalism on the problem of the origin of the notion of personal identity. Indeed, as Singer notes, “Hume might [...] have stopped at that point, congratulating himself on his explosion of a non-naturalistic notion of the self.”³⁵⁹ This is, however, not what happened: as already mentioned, Hume retracted his bundle theory a year after publishing the *Treatise*.

³⁵⁴ Hume (1969 [1739/40]), p. 299: “There are some philosophers, who imagine that we are every moment intimately conscious of what we call our Self; that we feel its existence and its continuance in existence; and are certain, beyond the evidence of demonstration, both of its perfect identity and simplicity.”

³⁵⁵ Hume (1969 [1739/40]), p. 300 [boldface added].

³⁵⁶ Hume (1969 [1739/40]), p. 257.

³⁵⁷ Hume (1969 [1739/40]), p. 300.

³⁵⁸ James (1890), p.352.

³⁵⁹ Singer (2000), p. 232.

In the supplement to his *magnum opus*, the Scottish philosopher admits that he now finds his account of personal identity to be “very defective” as it cannot account for “the principle of connection” that binds perceptions together.³⁶⁰ Furthermore, he adds, “All my hopes vanish [...] when I come to explain the principles that unite our successive perceptions in our thought or consciousness. I cannot discover any theory.”³⁶¹ So not only does Hume *retract* his former theory, but simply throws in the proverbial towel. He concludes: “For my part, I must plead the privilege of a sceptic, and confess, that this difficulty is too hard for my understanding.”³⁶²

In attempting to gain insight into the labyrinth Hume finds himself in, his students today are faced with yet another inextricable maze: the proliferation of secondary literature on whether Hume actually did have a problem, and if so, what it was, and finally, how it might possibly affect other parts of his naturalized theory of human nature.³⁶³ Most generally, however, it is fairly safe to say that the section on personal identity, combined with its later retraction, are the point where the Achilles heel of Hume’s project becomes apparent.³⁶⁴ In the context of this dissertation, we need not indulge in the painstaking task of grasping all of the particular details and dimensions of the problem of Hume’s retraction, as it has occupied philosophers in the last centuries. It suffices to gain general insight into (i) the manner in which Hume’s methodology failed him in *Of Personal Identity*, and (ii) whether his failure affects his associationist psychology of the object.

3.3.1.1 Hume’s Quasi-Observational Strategy

In the section on personal identity, it is no longer the philosopher himself who imposes his naturalistic methodology on problems of mind, but the other way around: the specificity of Hume’s interrogation of the self is fully determined (and restricted) by his self-imposed methodological framework, which (a) makes the mere question of the self qua connecting or unifying principle unintelligible, and (b) consequently leads Hume to produce an altogether quite trivial phenomenological description of the ‘theatre of mind’ as a bundle of transient and disparate perceptions and experiences.³⁶⁵ The basic

³⁶⁰ Hume (1969 [1739/40]), p. 677.

³⁶¹ Hume (1969 [1739/40]), p. 677.

³⁶² Hume (1969 [1739/40]), p. 678.

³⁶³ For an overview of competing interpretations, see for example Waxman (1992), Roth (2005), Ainslie (2011), Strawson (2011), and Rocknak (2013).

³⁶⁴ This most general interpretation aligns with those offered by Pears (1993), Singer (2000), Stroud (2006), and Frank (2002, 2004), among others.

³⁶⁵ Also see Singer (2000) p. 233: “Hume explicitly says that somehow things go badly for his own naturalistic account of the self; and things seem to go badly [...] by Hume’s own naturalistic standards.”

premise of Hume's research was therefore aptly described by Chisholm as follows: if we can conceive of ourselves, we *must* do so in the same way as that "in which we perceive or apprehend [...] external things [...]." ³⁶⁶

In a sense, Hume was of course right to conclude that upon introspection, what one finds (or 'stumbles upon') is never a perfect identity or unity, but always the consciousness of something else (i.e. a flux of perceptions). But then again, it has been contended that he might have progressed a bit further on this matter, if only he had somehow noticed that the self that he "professed to be unable to find, is the one that he finds to be stumbling – to be stumbling onto different perceptions." ³⁶⁷ The problem he stumbled upon concerns the very trivial fact of the non-observability of the subject *qua* connecting or uniting principle, or, in Russell's terms, the fact that the subject of experience is not "empirically discoverable." ³⁶⁸ As Zahavi puts it, Hume was simply "looking [...] in the wrong place." ³⁶⁹ However, the point is not so much that Hume was looking in the wrong place, but rather that he had no other option *but* to attempt to derive the self from an inward glance. It was the only place he could look for it, given the restrictions imposed by the empiricist prescriptions of his investigation. But if Hume was simply looking in the wrong place, he would have looked somewhere else in his *Appendix*, instead of giving up on the entire matter. Why then did he retract his theory?

In studying Hume's bundle account, one is immediately struck by an apparent reflexivity. More particularly, Hume's bundle theory simply does not work without presupposing a bundling self. ³⁷⁰ The methodological perplexity with regard to the question of the self, which the empiricist inevitably faces, was accurately described by the associationist philosopher Johnson: ³⁷¹

All states of consciousness [...] imply and postulate a subject Ego, whose substance is unknown and unknowable, to which states of consciousness are referred as attributes, but which in the process of reference becomes objectified and becomes itself an attribute of a subject Ego which lies still beyond, and which ever eludes cognition though ever postulated for cognition.

³⁶⁶ Chisholm (1969), p. 10; also see Roth (2000). With respect to the methodological implications of empiricism with regard to the interrogation of the subject, a very interesting analysis can be found in Frank (2002; 2004).

³⁶⁷ Chisholm (1969), p. 10.

³⁶⁸ Chisholm (1969); Russell (2003 [1986]), p. 294.

³⁶⁹ Zahavi (2003), p. 61.

³⁷⁰ In this respect, also see for example Brook (1994), p. 210: "About this notion of the mind as a bundle of mental states, everyone immediately asks, what ties these states together? What has these states? What understands them, forms attitudes to them, acts on what they contain, and so on?"

³⁷¹ Johnson as quoted in James (1890), p. 355.

As Frank noted, this apparent circle “arises from the fact that, in order to grasp itself reflexively, the Ego must always already have been acquainted” with itself.³⁷² Yet, this necessary self-reflexivity cannot be found *in* experience, i.e., it is not a form of object-consciousness. The conflation between the principle of the self as a uniting principle on the one hand, and as a dimension of sense experience on the other, inevitably leads to the infinite regress and circularity.³⁷³

The supposition that every item of self-knowledge rests on identification [...] leads to infinite regress [...]. [I] would be unable to identify an introspected self as myself by the fact that it is introspectively observed by me, unless I know it is the object of my introspection, i.e., unless I know that it is in fact me who undertakes the introspection. Importantly, this knowledge cannot itself be based on identification, on pain of infinite regress [...].

In this passage, Legrand recapitulates the basic problem with empiricist accounts (or *perceptual* models) of the self, that has also lead Frank to reject what he calls ‘objectal accounts of the self’ altogether.³⁷⁴ From this perspective, the structure of Hume’s Labyrinth can be schematized as follows:

- (i) empiricism prescribes that for something to be intelligible, it should be derived from experience.
- (ii) Hence, the very idea of a mind or self, should be derived from experience, and must itself be considered as an associative compound (a ‘bundle’).
- (iii) The possibility of association (associability), however, hinges on subjective principles that challenge the account of the mind as a mere ‘bundle’.
- (iv) Hence, the bundle theory of the self is either self-refuting, or hopelessly circular, i.e., it presupposes the very thing to be explained.

Unfortunately, Hume’s methodological framework simply did not allow him to avoid this circularity, and instead, he famously plead the privilege of the sceptic.

³⁷² Frank (2004), p. 67.

³⁷³ Legrand (2007), p. 587.

³⁷⁴ For a very accurate and in-depth analysis of this problem, see especially Shoemaker (1968). Also see Frank (2004, 2007).

3.3.1.2 Hume's Labyrinth: Broader Implications

Quite a few authors have pointed to the possible detrimental effects of Hume's aporia with regard to the self on the soundness of his psychological project. As early as 1885, Thomas Hill Green, for example, argued that: "[T]he more strongly Hume insists that the identity which we ascribe to the mind of man is only a fictitious one, the more completely does his doctrine refute itself."³⁷⁵ Cassirer, in his turn, claimed that what Hume experienced in his labyrinth, was nothing less than "the collapse of the sensualistic scheme of knowledge":³⁷⁶

He [Hume] dissolves external and internal experience in connections [Beziehungen], but he does not have the means to understand the objective validity [objektive Geltung] of these connections themselves, as he has asserted [...] impressions as the final standard of knowledge. [...] [T]he conceptual function by virtue of which sensations are united in a lawful unity is [...] without justification and ground, even though we cannot even consider to give it up or make it redundant.

More recently, Roth, Stroud, Waxman, Singer, Strawson and Inukai, among others, have likewise argued, in one way or another, that the idea of the self as a bundle threatened the foundation of Hume's associationist psychology.³⁷⁷ Most generally, all of these criticisms unfold from a central paradox in Hume's system, namely that his naturalistic framework (a) presupposes a *principle* of subjectivity, i.e. an active, unitary subject, which (b) cannot, however, be accounted for within the naturalistic framework itself. As Strawson aptly describes:³⁷⁸

³⁷⁵ Hill Green (1885, p. 297-299) focuses on the circularity in Hume's account, due to the fact that his whole naturalized conception seems to be based upon the non-naturalizable, and thus non-accountable,-- mind or self as a principle of unity and synthesis: "Having learnt, through the discipline which Hume himself furnishes, that the recognition of a system of nature logically carries with it that of a self-conscious subject, in relation to which alone 'different perceptions' become a system [...] we know that we cannot naturalise the 'human mind' without presupposing that which is neither nature or natural [...]."

³⁷⁶ Cassirer (1922), p. 387.

³⁷⁷ While Waxman (1992, p. 234) argues that without a unifying principle Hume could not account for "the consciousness of perceptual succession [...] presupposed for the imagination to associate perceptions," Roth (2000) contends that Hume's bundle theory was highly problematic with regard to his theory of the object (see below). Stroud (2006, p. 344) in his turn argues that the principles of imagination are simply too meagre to account for the genesis of beliefs and thoughts, and that Hume, on account of his own methodology, can simply not assume that "there are such things as active, thinking human beings with experiences and thoughts." As will be explained below, Inukai (2007) takes issue with the 'bundling problem', i.e. the problem that the possibility of association depends somehow upon the ordered manner in which impressions present themselves, prior to any associative activity.

³⁷⁸ Strawson (2011), p. 134.

Hume's empiricist project can't be completed because it fails to account for the mind itself. His theory is fundamentally flawed: it works explicitly with something that it officially holds to be unintelligible. That is the kind of thing that makes a person's hopes vanish.

In other words, although Hume's methodology allows for no conception of the subject other than a "place [...] not different from what takes place in it," to borrow Deleuze's description, his associationist account implicitly relies on a subject that is a function of unity and synthesis.³⁷⁹ Only by means of the latter presupposition would Hume be able to account for (a) the principles that determine the psychological tendency to associate impressions into determined bundles, which furthermore (b) are experienced by, and refer to, an experiencing subject.³⁸⁰

As Hume acknowledges, his theory needs an account of the necessary 'connecting principle' that underlies the very possibility of association.³⁸¹ As such, one of the problems he faces pertains to the necessary foundation of associative construction, or *associability*. If there is no order whatsoever to be found in the manner in which impressions appear and succeed one another, it is hard to see how the associative principles could *in and by themselves* produce the belief in identity over time, without presupposing that they already present themselves in some kind of ordered manner. This is what Inukai, in a recent article, referred to as 'the bundling problem':³⁸²

Hume realizes in the Appendix that he finds himself unable to explain a crucial psychological fact not only presupposed, but also required by his account of the psychological mechanism [...] His account [...] is in jeopardy [...]. This essential presupposition is that perceptions initially occur as already bundled together such that they come as members of a particular bundle or sequence prior to the associating activity of imagination.

³⁷⁹ Deleuze (1991 [1953]), p. 23. Singer (2000, p. 232) formulates it as follows: "There is unending debate about exactly what apparently insuperable problem Hume is pointing out in the 'Appendix' passage. My general sense is that Hume is saying that the 'glue' that connects our various experiences is too weak even to account for a workable fiction of personal identity. Perhaps this means that his neutral explanatory naturalism has failed, or perhaps, though he has produced an explanation of belief in personal identity, the explanation is such as to render that indispensable belief ridiculous, thus falling afoul of [...] naturalism's requirements."

³⁸⁰ See Waxman (1992), p. 242: "[T]he observation of temporal contiguity implies consciousness of perceptual succession, and so presupposes 'principles, that unite our successive perceptions in our thought or consciousness'. Being unable to account for retention by either ideal or real principles of connection, Hume found himself 'involv'd in [...] a labyrinth'."

³⁸¹ Hume (1969 [1739/40]), p. 677. See section 3.3.

³⁸² Inukai (2007), p. 261.

To understand this problem it suffices to reflect, for example, on the intelligibility of the notion of ‘succession’. More particularly, one cannot sensibly talk about the flux of sensations in terms of succession prior to any associative activity, without presupposing that the flux has already been constituted as, or is by in and by itself, a coherent series. Given that Hume vehemently denies the idea of *real* connections on the one hand, and cannot take up (non-naturalizable) functions of subjectivity in his empiricist reflection on the other, this remains an insurmountable problem in his theory.³⁸³ The problem at stake was later formulated by Kant as follows:³⁸⁴

It is [...] a merely empirical law in accordance with which representations that have often followed or accompanied one another are finally associated with each other and thereby placed in a connection [...]. This law of reproduction, however, presupposes that the appearances themselves are actually subject to such a rule, and that in the manifold of their representations an accompaniment or succession takes place according to certain rules; for without that our empirical imagination would never get to do anything [...] and would thus remain hidden in the interior of the mind, like a dead [...] faculty.

The problem at stake has likewise been described in more psychologistic terms. From this perspective, Hume’s ‘bundling problem’ appears as the problem of the *motive* for the psychological tendency to associate:³⁸⁵

Hume believes that a succession of perceptions is related in a certain way such that they tend as a matter of psychological fact to be run together [...]. Hume is worried that he cannot figure out how such perceptions might be related for this psychological tendency to be triggered.

In addition to the problem of *associability*, or what Kant would call *synthesis*, however, Hume faced the related problem of the unity of experience. To grasp the problem at stake, one can start with pinpointing that his bundle theory of the self implies that the idea of the self, as well as that of external existence, are derived from *exactly the same series* of impressions.³⁸⁶

³⁸³ See Hume (1969 [1739/40]), p. 307: “[W]e suppose the whole train of perceptions to be united by identity; a question naturally arises concerning this relation of identity; whether it be something that really binds our several perceptions together or only associates [...] in imagination. [...] This question we might easily decide [...] the understanding never observes any real connexion among objects [...] from thence [...] it follows, that identity is nothing really belonging to [...] perceptions.”

³⁸⁴ *CPR* [A100]; also see Waxman (1992), Lloyd (1993).

³⁸⁵ Roth (2000), p. 92.

³⁸⁶ Roth (2000), p. 113.

There is a problem *within* Hume's introspective psychology: his accounts of object and personal identity are fundamentally at odds. A temporary way out is to retract the account of personal identity [...]. Hume characterized psychological forces in terms of association in the imagination which leads to running perceptions together and treating them as if they had an identity over time. Given such an understanding of the psychological forces at work, it is hard to see how one might derive from the very same succession of subjectively accessible perception on the one hand the idea of personal identity – a single self unified over time – and on the other hand a plurality of worldly objects.

In other words, Hume's bundle theory gravely affects his psychology of the object, and even makes it unintelligible. If he retains his bundle view, object and self would have to be constructed within the same series, without there being any means available whatsoever to differentiate between the two. Hence, there would be no self, no object, no experience; only a chaotic universe of data with no subject to experience them. Hume's retraction, however, does not solve the problem either, but rather conceals it.³⁸⁷ The question remains: how can there be experience, without a subject that somehow relates to itself as the one experiencing, and therefore, without a subject in a position to differentiate between itself as experiencing and the things experienced? Lloyd aptly formulates the problem as follows:³⁸⁸

Even if Hume thought there were only one self in existence – although of course as a good sceptic he could not claim to know that – the problem which reduces him to dismay in the appendix would remain. His real problem lies in getting a workable distinction between the intellectual world [...] and that other world, supposedly there as independent object of knowledge. [...] In telling Humean stories of the origin of beliefs, we must presuppose [...] a unifying subject, as we might now say. And this is what Hume cannot presuppose. [...] [D]oes not the whole picture fall apart? [...] The possibility of making connections within a mental world presupposes that there is already a kind of unity of consciousness. And it is in accounting for this unity that Hume has difficulty.

As Patten, Lloyd, Waxman, and Strawson noted, the problem at stake was likewise attended to in Kant's first *Critique*. Patten even went so far as to claim that Kant's analysis of experience was at least partially meant as a direct attack on Hume's bundle theory.³⁸⁹ In his *CPR*, the Prussian philosopher famously stated that:³⁹⁰

³⁸⁷ Waxman (1992), Lloyd (1993).

³⁸⁸ Lloyd (1993), p. 65-67.

³⁸⁹ Patten (1976); Waxman (1992); Lloyd (1993). Patten's suggestion aligns with Kitcher's (1982) reading of the Transcendental Deduction as a response to Hume's problem of personal identity (see chapter 4).

The *I think* must be able to accompany all my representations; for otherwise something would be represented in me that could not be thought at all, which is as much as to say that the representation would either be impossible or else at least would be nothing for me. [...] Thus all manifold of intuition has a necessary relation to the *I think* in the same subject in which this manifold is encountered.

In other words, Kant determines experience to be a necessary function of the self-referential structure of the I, and, according to him, it is only by virtue of this transcendental principle that we could ever encounter *a something* that is differentiated from, and related to, the unity of self-consciousness. The possibility of experience itself, in this sense, depends on the ability of the subject to determine itself as the unitary and identical point to which all mental contents relate.

To summarize, the questions raised by the bundle theory and Hume's later retraction of it by far exceed the framework of methodological naturalism, and indeed provide a compelling argument for a different treatment, or a shift in perspective, as Patten observed.³⁹¹ In the first instance, however, (the problems of) Hume's science of man did not inspire a transcendental shift, but rather what one might call a regression to the 'vulgar standpoint'. To be more specific, in the wake of his philosophy, the common-sense movement (originating in the works of Thomas Reid) arose, in an attempt to circumvent the apparent absurdities to which the vigorous implementation of the naturalistic framework with regard to the study of mind seemed to lead. For the sake of historical continuity, we will briefly discuss the common-sense treatment of the psychological problem of the object. Furthermore, this discussion provides the necessary rhetorical background against which to understand John Stuart Mill's nineteenth-century resurrection of the neo-Humean approach to the object, which in its turn signifies an important point of reference for an analysis of the empirical dimension in Helmholtz's work.

³⁹⁰ Patten (1976); *CPR* [B131-132].

³⁹¹ Patten (1976).

3.4 The Genesis of the Object: Empiricism versus Common-Sense

It seemed very natural to think, that the ‘Treatise of Human Nature’ required an author, and a very ingenious one too; but now we learn that it is only a set of ideas which came together and arranged themselves by certain associations and attractions.

- Thomas Reid (1852 [1764]), p. 110

Hume’s “new scene of thought” stirred up the philosophical landscape considerably, and as a response to his naturalistic, sceptical program, a generation of philosophers stood up to defend the rights of common sense against the “melancholy gloom” of scepticism.³⁹² “It seems to be a peculiar strain of humour,” Thomas Reid, the founder of the common-sense tradition, writes about Hume’s *Treatise*, “to set out [...] by promising [...] a complete system of the sciences upon a foundation entirely new [...] when the intention of the whole work is to shew, that there is neither human nature nor science.”³⁹³ The most general characteristic of the common-sense movement is the undoing of Hume’s first philosophical gesture, i.e. the bracketing or suspension of vulgar consciousness, and the restoration of the vulgar attitude as the first principle of philosophy. In the “remarkable conflict [...] between the vulgar [...] and [...] the philosopher,” Reid states, “I find myself classed with the vulgar.”³⁹⁴ As such, common-sense philosophy unfolded from the acceptance of the authority of the ‘testimony of consciousness’ as the first and last reference point for philosophical reflection.³⁹⁵ With

³⁹² Reid (1852 [1764]), p. 142.

³⁹³ Reid (1852 [1764]), p. 102. Reid’s *Inquiry into the Human Mind*, from which we quote here, was written twenty-five years after Hume’s *Treatise* first appeared, and it can be read as being above all an attack on scepticism, and in particular on Hume’s views as expounded in the *Treatise*. Nevertheless, in a personal correspondence with his adversary, Reid expresses his admiration for the works of the Scottish sceptic, and suggests that he could critically review the draft of his *Inquiry* (Reid, 1852, p. 91-92). As could be expected, Hume was not univoqually excited about Reid’s work (for the specific details of Hume’s reception of Reid’s work, see among others Wood, 1986). As I intend to offer only a general sketch of the features of Reid’s (and Hamilton’s) alternative to the Humean treatment of the problem of externality and the self, I will not engage in the details of Reid’s overall philosophical project, nor in those of the polemics with Hume.

³⁹⁴ Reid (1852 [1785]), p. 302. Further on he continues (Reid, 1852 [1785], p. 456): “There is no reason why the opinion of a philosopher should have more authority than that of another man of common sense, who has been accustomed to judge [...]. The illiterate vulgar are competent judges [...].”

³⁹⁵ Reid (1852 [1788]), p. 513: “[T]he testimony of consciousness can never deceive. [...] The testimony of consciousness is always unerring [...].” Reid’s testimony is derived mainly from the direct, introspective

respect to the psychological problem of the object, this methodological shift automatically lead to straightforward intuitionism.³⁹⁶

When [...] consciousness assures us that, in perception, we are immediately cognizant of an external and extended non-ego; [...] how shall we repel the doubt? We can do this only in one way. [...] [T]he deliverances of consciousness must be philosophically accepted [...] [T]he testimony of consciousness must be viewed as high above suspicion, and its declarations entitled to demand prompt and unconditional assent.

Based on the absolute authority of the testimony of consciousness, Reid concluded that the idea of ‘thinghood’ is an unanalyzable, immediate, and natural ingredient of consciousness. Subsequently, Reid employed the same strategy in accounting for the notion of the self, and arrived at the conclusion that the self is a primitive concept, “suggested by our constitution.”³⁹⁷ The common-sense philosopher furthermore argued that his intuitionist account is the only sound alternative to Hume’s ‘metaphysically absurd’ assumption “that sensation and thought may be without a thinking being [...]”³⁹⁸

Despite his rather unsophisticated refutation of Hume’s account of the object and the mind, Reid is to be credited as the first to make a clear distinction between sensation and perception in his theorizing, with the former being defined as “something which can have no existence but in a sentient mind,” and the latter as that which “hath an object distinct from the act by which it is perceived.”³⁹⁹ Furthermore, he defined the relation of sensation to the thing perceived in terms of *denotation* (and not resemblance): sensation is to the perceived object what a sign is to a thing signified. In accordance with this general assumption, the perceptual process is conceived of as being essentially a process of signification.⁴⁰⁰

Contrary to Hume’s naturalized theory of belief however, Reid maintained that the “belief in present existence, [...] is the immediate effect of [...] constitution.”⁴⁰¹ So although Reid accepted the difference between the act of perceiving and the thing to which it relates, the sensation-sign nevertheless *suggests* its object by virtue of what he

evidence of consciousness. Therefore, contrary to Hume, his philosophy of mind is not as much based on analysis or decomposition, but rather on testimony and description.

³⁹⁶ Reid (1852 [1788]), p. 745.

³⁹⁷ Reid (1852 [1764]), p. 110.

³⁹⁸ Reid (1852 [1764]), p. 108.

³⁹⁹ Reid (1852 [1764]), p. 183.

⁴⁰⁰ Also see Helmholtz, section 1.2.2.

⁴⁰¹ Reid (1852 [1764]), p. 183.

calls a ‘natural kind of magic’, and his semiotic theory, i.e. his ‘theory of natural suggestion’, thus amounted to a form of natural realism or presentationism: “nature hath established a real connection between the signs and the things signified, [...] so that the sign suggests the thing signified, and creates the belief of it.”⁴⁰² In perception, we pass immediately from the sign to the thing signified by virtue of the ‘real connection’ between sign and signification. The belief in external existence, Reid added, is the “effect of instinct,” an “original principle of our constitution.”⁴⁰³

A quite similar approach to the problem of the object was developed by Sir William Hamilton, a commentator and critic, but also an undeniable disciple of Thomas Reid.⁴⁰⁴ First and foremost, Hamilton systematized the various systems with regard to the relation between the internal and the external in perception. Although he may not be considered a figure of great importance today, he undoubtedly was one of the most influential thinkers of his time.⁴⁰⁵ Hamilton conceived of philosophy as quasi identical to philosophy of mind, and, accordingly, matters pertaining to the mental were high on his philosophical agenda. With regard to the problem of the origin of the object in perception, Hamilton put forward his theory of ‘the natural duality of consciousness’, which was likewise the product of a philosophizing that took the authority of the testimony of consciousness as its point of departure: “We must look to consciousness and to consciousness alone for the materials and rules of philosophy,” he writes in 1859.⁴⁰⁶ Interestingly enough, the issue that his predecessors had formulated as the problem of *the belief* in existence or externality, is transformed by Hamilton into a matter of the *structure* of consciousness. His treatment of the problem starts from a phenomenological description of consciousness as a dual structure:⁴⁰⁷

⁴⁰² Reid (1852 [1764]), p. 122, 195.

⁴⁰³ Reid (1852 [1764]), p. 162, 185.

⁴⁰⁴ For the sake of completeness, it should be mentioned that Hamilton, although firmly anchored in the empirical tradition, had also undergone a significant influence of Kant, which is revealed, for example, by his distinction between noumena and phenomena, which formed the foundation of his own ‘theory of the conditioned’, which states that “the conditionally limited [...] is thus the only possible object of knowledge [...]. To think is to condition; and conditional limitation is the fundamental law of the possibility of thought. For as the greyhound cannot outstrip his shadow, nor [...] the eagle outsoar the atmosphere in which he floats, and by which alone he is supported; so the mind cannot transcend that sphere of limitation” (Hamilton, 1861, p. 525). Hamilton’s attempt to reconcile Kantianism with common-sense philosophy has been criticized considerably, for example by Stirling (1865). Although the issue of Hamilton’s Kantianism complicates the overall interpretation of his work to a great extent, it can be put aside within the scope of our discussion of his account of external reference, which in the first place shows his allegiance to common-sense principles.

⁴⁰⁵ This is attested, for example, in the works of J.S. Mill (1878 [1865]), Fraser (1856), and Stirling (1865).

⁴⁰⁶ Hamilton (1859), p. 288.

⁴⁰⁷ Hamilton (1859), p. 203.

[C]onsciousness [...] supposes a contrast, - a discrimination; for we can be conscious only inasmuch as we are conscious of something. [...] We are conscious of self only in and by its contradistinction from not-self; and are conscious of non-self only in and by its contradistinction from self.

This implies an interesting change in perspective: the question for Hamilton did not pertain as much to the origin of a mental *content*, but rather to the differential *form* of (perceptual) consciousness. In this formulation of the problem, the question concerning the genesis of a Not-I is intrinsically related to that of the self, as both are part of one and the same structure. However, owing to his use of the introspective method, Hamilton's theorizing was hardly able to move beyond the point of a phenomenological description:⁴⁰⁸

[W]e are immediately conscious in perception of an ego and a non-ego, known together, and known in contrast to each other. This is the fact of the duality of consciousness. It is clear and manifest. When I concentrate my attention in the simplest act of perception, I return from my observation with the most irresistible conviction of two facts [...]; - that I am, - and that something different from me exists. In this act, I am conscious of myself as the perceiving subject, and of an external reality as the object perceived; and I am conscious of both existences in the same indivisible moment of intuition. The knowledge of the subject does not precede, nor follow, the knowledge of the object, - neither determines, neither is determined by, the other. Such is the fact of perception revealed in consciousness [...].

As Hamilton accepts the immediate testimony of consciousness as the first principle of philosophy, and as the proper method to determine the primitive facts of a theory of mind, he thus concludes from this introspective observation that⁴⁰⁹

[...] we may [...] lay it down as an undisputed truth, that consciousness gives, as an ultimate fact, a primitive duality; - a knowledge of the ego in relation and contrast to the non-ego [...] The ego and non-ego are, thus given in an original synthesis.

Hamilton's take on the matter likewise amounts to the assumption of the category of the Not-I as a primitive, unanalyzable element of (perceptual) experience.

In conclusion, Reid's and Hamilton's theorizing attempted to counter the problems inherent to Hume's approach, by denying that the concepts of the object and the self can be analyzed, and by assigning an intuitive status to them instead. From the perspective of the historical development of empirical psychology, this temporary

⁴⁰⁸ Hamilton (1859), p. 288.

⁴⁰⁹ Hamilton (1859), p. 292.

departure from the Humean scene of thought meant somewhat of a setback. Bluntly put, by reinstating the authority of vulgar consciousness, common sense has eliminated the very motive one could have for indulging in an analysis of mental phenomena.

Although Sir William Hamilton was one of the most eminent philosophers of his time, one of the reasons he soon fell into historical oblivion was the devastating attack on his philosophical system presented in J.S. Mill's 1865 *An Examination of Sir William Hamilton's philosophy*.⁴¹⁰ Mill's view on the matter can be characterized most generally as a return to Hume's psychology of the object, which would set the stage for the dawn of empirical psychology in the nineteenth century and inspired Helmholtz's psychology of the object considerably.

3.5 John Stuart Mill's Return to Hume's Perspective

In his voluminous *An Examination of Sir William Hamilton's Philosophy* (1865), John Stuart Mill refuted Hamilton's intuitionist theory of consciousness (chapter X), outlined his own psychological theory of the object (chapter XI), and that of the self or Ego (chapter XII). The stakes of this polemic pertained especially to the appropriate method to be used when studying the mind, so as to enable the philosophy of mind to progress from the level of mere speculation and description to that of an analytical science, properly so called. With the discussion of Mill's work, we are thus engaging in what can be considered a prologue to the rise of psychology as an autonomous science, which is commonly said to have been officially inaugurated with the instauration of Wilhelm Wundt's *Psychological Institute* in Leipzig in 1879.⁴¹¹

Mill's discussion of what he considered to be one of the most central questions of the philosophy of consciousness, i.e. the "distinction between myself – the Ego – and a world [...] external to me," is an instance of his more general attempt to articulate a program for a science of man, for which he had laid the foundation in the sixth book of his *A System of Logic* (1843), entitled *On the logic of Moral Sciences*.⁴¹² Soon after Jacob

⁴¹⁰ Posy (2003).

⁴¹¹ Boring (1950); Robinson (1986). With regard to the methodology of psychology as an autonomous science, Schmidgen (2003, p. 471) points out the important indebtedness of Wundt, who was Helmholtz's assistant in Heidelberg from 1858 to 1862, to Mill's *A System of Logic* (1843) in the former's articulation of the goals of scientific psychology as the "complete decomposition [Zergliederung] of conscious phenomena into their elements" (Wundt, 1882, p. 399 as quoted in Schmidgen, 2003, p. 471).

⁴¹² Mill (1878 [1865]), p. 6; Mill (1882 [1843]), p. 579-659.

Schiel's 1849 translation of this work appeared in Germany, it had an enormous influence.⁴¹³ The general outline of Mill's *Logic* suggested a view on scientific methodology and reasoning that fundamentally departed from the so-called *a priori* view of human knowledge. Instead, it proposed a methodology for the natural sciences based on experimentation and experience, founded in the inductive method. It is important to specify that Mill's conception of 'the *a priori* school' is very (even excessively) broad, and denotes not only German idealism, but likewise all forms of nativism and intuitionism with regard to mental contents. From this perspective, Mill puts Hamilton's intuitionism on a par not only with Reid, but also with Kant, stating that "the test by which they all decide a belief to be a part of our primitive consciousness – an original intuition of the mind – is the necessity of thinking it."⁴¹⁴

Mill's *Logic* – "not the science of Belief, but the science of Proof, or Evidence"⁴¹⁵ – soon found an audience among German scientists and philosophers, who were trying to get out from under the grip of metaphysical speculation (see chapters 1 and 2). Correlative with the gradual crumbling of the hegemony of absolute idealism, inductive empiricism became increasingly dominant, not in the least with respect to the study of mental phenomena.⁴¹⁶ From his *Treatise*, it is clear that Helmholtz had read and appreciated Mill's *Logic*, and based certain elements of his own theory on Mill's account of induction (see section 3.6).⁴¹⁷ Moreover, one cannot fail to notice a programmatic similarity between Helmholtz's project of a psychology of perception and Mill's (neo-Humean) general plea for the *a posteriori* method of philosophical reasoning.⁴¹⁸

⁴¹³ It should be noted that Jacob Schiel's 1849 translation of the sixth volume of Mill's *A System of Logic, Von der Logik der Geisteswissenschaften oder Moralischen Wissenschaften*, is commonly credited with introducing the very term of 'Geisteswissenschaft' in Germany (see for example Gadamer 2006 [1975] and Makkreel & Luft, 2010).

⁴¹⁴ Mill (1878 [1865]), p. 142. One could obviously object that this allegation implies an unwarranted identification of (radically different) schools of thought (common-sense intuitionism and Kantian transcendentalism). While this criticism is completely justified – it suffices to point out the immense difference between (i) common sense's introspective method and Kant's transcendental regression, and (ii) genetic versus transcendental apriorism, for example – and while Mill could indeed have been somewhat more refined in the identification of his enemy, it is unlikely that this would have had any effect on his disapproval of both. The 'conflation' at work here is no more than a part of a rhetorical strategy to put forward his own empiricist philosophy, which is indeed intended to challenge common sense as well as Kantianism, although it can be argued that the challenge faced is not the same with respect to both schools.

⁴¹⁵ Mill (1882 [1843]), p. 21.

⁴¹⁶ See for example Schnädelbach (1984).

⁴¹⁷ Helmholtz (1867 [1856/1866], III), p. 447. It is not clear which version of Mill's *A System of Logic* Helmholtz actually read. Steege (2012, p. 168) suggests that Helmholtz most likely read the second 1862 translation, since he mentions Mill in a lecture in that same year, but this remains a tentative hypothesis.

⁴¹⁸ As will become clear, with regard to the methodology Mill proposed for the science of man, he indeed stands "in an English tradition of which Hume has given the most effective formulation in the introduction to

In the sixth volume of *A System of Logic*, Mill set out to show that “There is, or may be a science of human nature,” a science, that is, which takes the physical sciences as its example as far as its method is concerned.⁴¹⁹ Similar to Hume’s Newtonian-inspired analysis, Mill’s conception of the science of man envisioned (i) a genetic study of mental phenomena (as distinguished from metaphysical speculation on the nature of the mind-in-itself)⁴²⁰, which (ii) takes as its point of departure invariable laws that “have been ascertained by the ordinary methods of experimental inquiry,” i.e. the laws of association, and (iii) is to be distinguished not only from metaphysics, but likewise from physicalist approaches to the mind or ‘biologized psychology’.⁴²¹ Consequently, Mill’s defense of methodological naturalism goes hand in hand with a firm rejection of ontological reductionism. Mill argued for the autonomy of the psychological level of analysis, and consequently rejected the hypothesis of mental phenomena as “generated through the intervention of material mechanisms.”⁴²² As such, Mill’s science of man was rightfully credited by Albert Lange as an attempt to “assert the rights of psychology,” “against the strictly materialistic view.”⁴²³ Mill’s non-reductionist stance is illustrated for example by the following passage taken from his *A System of Logic*:⁴²⁴

Whether [...] mental states are [...] dependent on physical conditions, is one of the vexatae questiones in the science of human nature. [...] Many eminent physiologists hold the affirmative. These contend [...] that some particular state of our nervous system, [...] in particular [...] the brain, invariably precedes, and is presupposed by, every state of our consciousness. According to this theory, one state of mind is never really produced by another: all are produced by states of the body. [...] [T]hat every mental state has a nervous state for its immediate antecedent and proximate cause, [...] can not [...] be said to be proved, [...] and even were it certain, yet everyone must admit that we are wholly ignorant of the characteristics of these nervous states [...] [T]he successions therefore, which obtain among mental phenomena, do not admit of being deduced from the

his *Treatise*. Human science too is concerned with establishing similarities, regularities, and conformities to law,” as Gadamer (2006 [1975], p. 3) noted.

⁴¹⁹ Mill (1882 [1843]), p. 586.

⁴²⁰ Mill (1878 [1865], p. 14) dismissed the mind-in-itself as an “unknown something” and “a supposition without evidence.”

⁴²¹ Mill (1882 [1843]), p. 592. Mill referred to the laws as they are articulated in the works of Hume, his father James Mill, and Alexander Bain, and seemed to have in mind especially the laws of contiguity and resemblance. Also see Robinson (1986).

⁴²² Mill (1882 [1843]), p. 590.

⁴²³ Lange (1881), p. 189.

⁴²⁴ Mill (1882 [1843]), p. 590-591.

physiological laws of our nervous organization. [...] [T]herefore [...] there is a distinct and separate Science of Mind.

Mill's criticism of ontological reductionism in psychology is of utmost importance, as it is only by taking Mill's anti-materialist stance into account that one can make sense of his pivotal role in the development of psychology as an empirical science.

As suggested by the title of this section, Mill's work can be considered as a neo-Humean defense of empiricism or methodological naturalism, against what Snyder called the "looming danger" of intuitionism.⁴²⁵ Indeed, Mill seemed to be engaged in "a Manichean struggle between two schools of thought [...]."⁴²⁶ As the author of *A System of Logic* described it himself, with regard to questions pertaining to the mind, he found himself to be entering into the "arena of initial conflict" between "the two modes of philosophizing":⁴²⁷

[T]he *a priori* philosophers cataloguing some things as facts, which the others contend are inferences. The fundamental difference relates, however, not to the facts themselves, but to their origin. [...] [T]he one theory considers the more complex phenomena of the mind to be products of experience, the other believes them to be original.

Consequently, Mill defined the task of a science of man as the description of "the uniformities of succession, the laws, whether ultimate or derivative, according to which one mental state succeeds another; is caused by, or at least, is caused to follow, another."⁴²⁸ In what follows, the particulars of Mill's project for an empirical psychology will be made more tangible through a systematic sketch of his psychology of the object, as presented in his *Psychological Theory of the Belief in an External World*, i.e. chapter XI of his *Investigation*.⁴²⁹

⁴²⁵ Snyder (2006), p. 4. With respect to Mill's fierce opposition to intuitionism, the controversy between him and philosopher William Whewell has especially been emphasized and discussed (see for example Snyder, 2006). The present sketch of his main arguments against Hamilton's common-sense theory could however provide further insight in Mill's philosophical position, and his precise conception of philosophical methodology.

⁴²⁶ Scarre (1989), p. 204.

⁴²⁷ Mill (1867 [1859]), p. 102; an interesting account of the controversy between Hamilton and Mill is given in Phillipps (1866).

⁴²⁸ Mill (1882 [1843]), p. 490.

⁴²⁹ Mill (1878 [1865]), p. 225-239.

3.5.1 Mill's psychological theory of the belief in the external world

In examining Mill's criticism of Hamilton's theory of the natural duality of consciousness, one can hardly fail to notice its similarity to the rhetorical strategies used by Helmholtz to refute nativism (see chapter 2). To be more precise, Mill's criticism unfolds from three major objections, namely (i) the rejection of the introspective method as an adequate means of determining the primitive facts of consciousness, (ii) the metaphysical audacity of intuitionism, and (iii) the redundancy of the intuitionist hypothesis with regard to the genesis of the object in consciousness.

3.5.1.1 The Inadequacy of the Introspective Method

The most important argument Mill raised against intuitionism is that “we do not know by intuition what [...] is intuitive.”⁴³⁰ In itself, Mill argued, the introspectively established fact that the form of perceptual consciousness is fundamentally dual is quite obvious superfluous, and therefore “admitted [...] without appeal.”⁴³¹ On the other hand, however, Mill contended that the introspective immediacy of the differentiated nature of consciousness does not warrant Hamilton's intuitionist conclusion. More particularly, the intuition of an original duality does not at all exclude the possibility that the notion of a Not-I actually has a formative history in the mind. Even if no one is ever able to find anything in consciousness prior to the belief in the object, this still does not exclude that the belief could be experienced *as if* it were primitive, but is actually acquired through ‘strong association’.⁴³² Therefore, introspection cannot be considered to be a reliable method to distinguish between those elements of consciousness that are primitively given, and those that are acquired through learning and experience.⁴³³

3.5.1.2 The Metaphysical Audacity of Intuitionism

Referring to his broad category of *a priori* philosophers, Mill furthermore argued that those who take certain mental phenomena to be simple and immediate do so “not as psychologists, but as ontologists”.⁴³⁴

[T]he crowning peculiarity of each [i.e. the *a priori* and the *a posteriori* school] resides in the superstructure. That the constitution of the mind is the key to the

⁴³⁰ Mill (1878 [1865]), p. 172.

⁴³¹ Mill (1878 [1865]), p. 158.

⁴³² Mill (1878 [1865]), p. 183.

⁴³³ Mill (1878 [1865]), p. 182-184. This reminds of Helmholtz's objection to nativism as a theory that “assumes the very fact to be explained” (Helmholtz (1995 [1878b]), p. 357); see chapter 2.

⁴³⁴ Mill (1867 [1859]), p. 100.

constitution of external nature—that the laws of the human intellect have a necessary correspondence with the objective laws of the universe [...] —is the grand doctrine which the one school affirms and the other denies [...]. But this question is beyond the compass of psychology. The *à priori* philosophers, when they inculcate this doctrine, do so not as psychologists, but as ontologists.

In other words, irrespective of the methodology used, the assumption of the object as a primitive, unanalyzable element of consciousness relies on the metaphysical assumption of a pre-representational similarity, or original correspondence, between subject and object. Only by virtue of a Leibnizian assumption of pre-established harmony, can one assume that the Not-I is present on the level of the self without further mediation.⁴³⁵

3.5.1.3 The Redundancy of the Intuitionist Hypothesis

A final argument which Mill appealed to in his refutation of intuitionism is the principle of parsimony, which is supposed to prevent the proliferation of hypotheses such as Reid's 'mental magic' in the theory of mind. The intuitionist hypothesis, Mill contended, is utterly redundant.⁴³⁶

The first of the laws laid down [...] for the interpretation of Consciousness, the law [...] of Parsimony, forbids to suppose an original principle of our nature in order to account for phaenomena which admit of possible explanation from known causes. If the supposed ingredient of consciousness be one which might grow up [...] and if, when it had so grown up, it would, by known laws of our nature, appear as completely intuitive [...]; we are bound [...] to assign to it that origin.

Hence, Mill based his account solely on the known laws of thought, and considered this explanation to be preferred as the more parsimonious explanation.⁴³⁷

⁴³⁵ As we have seen in section 2.8, this argument is also very prominent in Helmholtz's criticism of nativism.

⁴³⁶ This argument likewise reappears in Helmholtz's work (see chapter 2), and also it aligns with Thomas Brown's (1850, p. 248) criticism of the common-sense account of the belief in externality, which is rejected by him because "we have no need [...] to invent a peculiar power of the mind for producing it [i.e. external reference]."

⁴³⁷ Again, we should point to the similarity with Helmholtz's arguments as presented in 2.8. It might indeed be contended, as Phillipps (1866, p. 79) did, that "in keeping out one [auxiliary hypothesis] [...], he [Mill] has called in a host of others." As will be outlined in section 3.5.2, it is more particularly with regard to the problem of the Ego that Mill encounters the restrictions of his empiricist framework, and can do nothing more than accept it as an unanalyzable, opaque and primitive fact of experience. The force of the argument here presented therefore might not be as persuasive as Mill thinks it is.

After this refutation of the intuitionist theory, Mill proceeded to outline his own *psychological* account, that set out to show that⁴³⁸

[...] there are associations naturally and even necessarily generated by the order of our sensations and of our reminiscences of sensation, which, supposing no intuition of an external world to have existed in consciousness, would inevitably generate the belief, and would cause it to be regarded as an intuition.

Only two general presuppositions are needed, according to Mill, in order for the empirical approach to the belief in externality to work, namely (1) the presumption that “the human mind is capable of expectation,” i.e. that it can conceive of future possibilities, and (2) the laws of association.⁴³⁹ Starting from these two postulates, Mill argued that it is theoretically possible to prove that the idea of the object is a psychological construct, produced through the association of sensations.⁴⁴⁰ More specifically, he hypothesized that the notion of the *object* as an independent existence in perception, arises from the recognition of a difference between *present* and *possible* sensations:⁴⁴¹

I see a piece of white paper on a table. I go into another room. [...] [T]hough I have ceased to see it, I am persuaded that the paper is still there. I no longer have the sensations which it gave me; but I believe that when I again place myself in the circumstances in which I had those sensations, that is, when I go again into the room, I shall again have them; and further, that there has been no intervening moment at which this would not have been the case. [...] The conception I form of the world existing at any moment, comprises, along with the sensation I am feeling, a countless variety of possibilities of sensation.

In other words, if we state that consciousness contains a belief in the Not-I, this means that apart from the flow of actual sensations, we recognize the permanent possibility of sensation as a conditional certainty.⁴⁴² From the totality of the disparate

⁴³⁸ Mill (1878 [1865]), p. 227.

⁴³⁹ Mill (1878 [1865]), p. 225.

⁴⁴⁰ Mill (1878 [1865], p. 7) defined sensations as feelings: “The objects excite, or awaken in us, certain states of feeling [...]. Take any familiar object, such as an orange. It is yellow; that is, it affects us, through our sense of sight, with a particular sensation of colour. It is soft; in other words it produces a sensation [...] of resistance [...] It is sweet; for it causes a peculiar kind of pleasurable sensation.” As in Hume, the difference between sensations and ideas merely pertains to their intensity: the idea is a faint version of the sensation. Furthermore, contrary to Helmholtz, Mill conceives of sensations as mental states, not bodily events (see for example Mill, 1882 [1843], p. 50).

⁴⁴¹ Mill (1878 [1865]), p. 228.

⁴⁴² Mill (1878 [1865]), p. 229.

sensations, certain aggregates are gradually set apart (i.e. those pertaining to external objects), as permanent possibilities of sensation, thus giving rise to the notion of perdurability and “the general notion of difference”:⁴⁴³

[W]e believe that we perceive a something closely related to all our sensations, but different from those which we are feeling at any particular minute; and distinguished from sensations altogether, by being permanent and always the same.

To account for the intuitive nature with which the belief in a Not-I emerges in consciousness, Mill introduced the *principle of obliviscence*, which postulates that the associative chain from which the idea of an object is generated, tends to “drop out of consciousness [...]”⁴⁴⁴ By virtue of this principle, “we see, and cannot help seeing, what we have learned to infer.”⁴⁴⁵ In conclusion, Mill summarized his theory as follows⁴⁴⁶:

[T]he very idea of anything out of ourselves is derived solely from the knowledge experience gives us of the Permanent Possibilities. Our sensations we carry with us wherever we go, and they never exist where we are not; but when we change our place we do not carry away with us the Permanent Possibilities of Sensation: they remain until we return, or arise and cease under conditions with which our presence in general has nothing to do.

In short, the notion of the object, according to Mill, is identified with the permanent possibility of sensation, as derived from the unconscious association of sensations. Mill’s psychological theory of the belief in externality thus resonates with Hume’s in important respects: the experience of thinghood is equated with having a belief, which is in turn claimed to have been constructed through associative processes. However, in resurrecting a Humean-inspired strict methodological naturalism, Mill also brings back to life Hume’s labyrinth.

⁴⁴³ Mill (1878 [1865]), p. 225.

⁴⁴⁴ Mill (1878 [1865]), p. 323 explained the principle as follows: “[W]hen a number of ideas suggest one another by association with such certainty and rapidity as to coalesce together in a group, those members of the group which remain long without being specially attended to, have a tendency to drop out of consciousness.” Also see Allik & Konstabel (2005).

⁴⁴⁵ Mill (1878 [1865]), p. 227.

⁴⁴⁶ Mill (1878 [1865]), p. 238.

3.5.2 Back into the Labyrinth: Mill and the Self

One striking feature of Mill's *Examination* – which, much to my surprise, has received almost no attention in secondary literature – is the way in which it reproduces Hume's Labyrinth. As Alan Ryan notes:⁴⁴⁷

Mill's philosophy required an active mind which would construct an external world out of sensations, and order it according to rationally organized theories; and yet he had no way of accounting for the existence of such an active intelligence. If the external world was to be constructed out of experience by a self which tried out inductive hypotheses about the course of its experience, then this presupposed a unitary self to do the experiencing, and to make inferences.

In other words, Mill's theory of the belief in externality as the Permanent Possibility of Sensation once again leads us to consider the failure of the strict methodological naturalistic approach to account for synthesis and unity.

The question of the self is addressed in a surprisingly short and quite puzzling chapter of Mill's *Investigation*, entitled *The psychological Theory of the belief in matter, how far applicable to mind*, which starts out with the question “whether, at the first moment of our experience, we already have in our consciousness the conception of Self as a permanent existence; or whether it is formed subsequently, and admits of a similar analysis.”⁴⁴⁸ Like Hume in his chapter on *Personal Identity*, Mill formulates the problem at stake as pertaining to the origin of a belief, and more in particular, as the belief in a mind as a continued and distinct existence, thereby transforming the problem of the ground of the unity of experience into an empirical question pertaining to the construction of a mental content.⁴⁴⁹

Mill's reasoning has the following buildup: if the belief in matter allows for an analysis in terms of the permanent possibility of sensation, then the mind can be equated with something like *a permanent possibility of feeling*, i.e. the imaginative compound of the flux of feelings presently experienced, and those to be experienced in the future. However, as Mill correctly observes, this would be an entirely circular account, as the very idea of permanent possibilities is grounded in the capability of expectation, and as such, the theory would presuppose the very thing it aims to

⁴⁴⁷ Ryan (1974), p. 226.

⁴⁴⁸ Mill (1878 [1865]), p. 240.

⁴⁴⁹ The assimilation of the Ego to the mind involves a conception of the Ego as essentially disembodied, as Ryan observed (1974, p. 223). But, like the notion of the self involves a certain materiality, one could also argue that the notion of the Not-I exceeds the realm of pure matter and can also refer for example to other minds (Phillips, 1866). At this point we are, however, mainly interested in Mill's psychological analysis of the Ego, and will leave the question concerning the soundness of this assimilation aside.

demonstrate. More specifically, Mill admits that the self would then have to be something like “a series of feeling, [...] aware of itself as a series,” which is a circular definition, and therefore inadmissible.⁴⁵⁰ Just as the case was with Hume, Mill’s methodological framework thus forces him to produce a circular account, described by Alan Ryan as follows: “any attempt to construct a Self out of the series of such sensations is circular, because knowing which sensations to count presupposes that they belong to my Self already.”⁴⁵¹ The only difference with Hume is that Mill gives up on the matter more quickly than did the Scottish sceptic. After pondering a bit more on the topic, he concludes that the self does not allow for psychological analysis, and admits:⁴⁵²

The truth is, that we are here face to face with that final inexplicability [...] [O]ne mode of stating it only appears more incomprehensible than another [...] I think, by far the wisest thing we can do, is to accept the inexplicable fact, without any theory of how it takes place.

The feeling of *déjà vu* grows even stronger when we consider the *Appendix* added in the 1878 version of the *Examination*, in which Mill acknowledges that “in so far as reference to an Ego is implied in Expectation, I do postulate an Ego.”⁴⁵³ At this point Mill seems to grant that the very ability to anticipate (which is implied in the concept of Expectation) presupposes a subject that is somehow aware of itself as a unity in time, referring past and future experiences to itself, while maintaining its numerical identity. The Ego, he states in the *Appendix*, is “the inexplicable tie, or law [...] which connects the present consciousness with the past one [...],” which “is as real as the sensations themselves, and not a mere product of the laws of thought.”⁴⁵⁴ Strikingly enough, however, he maintains that he can affirm the self as “the series of its feelings or consciousness [...] but beyond this, we can affirm nothing of it.”⁴⁵⁵

So on the one hand, the psychological method allows for nothing but a self as a bundle or a series, while on the other, Mill’s psychological theory of the object proceeds from the inexplicable postulate of the subject as a uniting principle that grounds the very possibility of association. In his attempts to account for this Ego, however, Mill is driven to the same aporetic corners of his naturalistic strategy that once had lead Hume to plea the privilege of the sceptic. As Mill only allows for knowledge that is given by, or

⁴⁵⁰ Mill (1878 [1865]), p. 248.

⁴⁵¹ Ryan (1974), p. 226.

⁴⁵² Mill (1878 [1865]), p. 262.

⁴⁵³ Mill (1878 [1865]), p. 258.

⁴⁵⁴ Mill (1878 [1865]), p. 262.

⁴⁵⁵ Mill (1878 [1865]), p. 263.

inferred from sensible information, in his own terms he is simply unable to account for the subject as the connecting principle that makes experience possible in the first place.

It did not take long for Mill's (lack of a) theory of the Ego to be criticized. Not surprisingly, those criticisms developed roughly along the same lines as the ones expressed regarding Hume's problem, i.e. the problem of synthesis and unity. The British idealist F.H. Bradley, for example, expressed his discomfort over the fact that Mill simply pushed the problem of the Ego aside as an 'inexplicable fact', as if thereby "he got rid of its existence."⁴⁵⁶ William James even considered Mill's work to be symptomatic for "the definitive bankruptcy of the associationist description of the consciousness of self."⁴⁵⁷ Just like Hume's, Mill's account, or attempted account, can be considered symptomatic for what James diagnosed as the "lurking bad conscience about the self" and the shyness "about openly tackling the problem of how it [the Self] comes to be aware of itself."⁴⁵⁸ Alan Ryan even expressed his puzzlement over the fact that Mill did not seem to realize "the extent to which this admission was a disaster for his whole philosophical system," as "the metaphysics to which Mill was committed had a contradiction at its heart."⁴⁵⁹ Andy Hamilton was one of the few writers to connect Mill's 'final inexplicability' to Hume's labyrinth, in writing that the former's perplexity with regard to the problem of the Ego⁴⁶⁰

[...] echoes Hume's confession of failure in his own Appendix to the Treatise, even if the tone appears unduly complacent rather than troubled. [...] Both writers, perhaps, suspect that a yawning chasm is opening up around their philosophical viewpoint, and would prefer not to peer into it.

Hamilton noted that Mill's attempt to reestablish methodological naturalism as the only legitimate framework for the study of the object, is a replication of Hume's labyrinth, which, for the purposes of this dissertation is a highly significant observation. It provides us with a motive for a shift towards the transcendental level of analysis, and as such, allows one to grasp the systematic nature of Helmholtz's empirico-transcendentalism, or his so-called dovetailing between empiricism and transcendental philosophy. Before diving into Helmholtz's strategy to avoid the problems of strict methodological naturalism, however, the continuity of his psychology of the object with those presented by Hume and Mill will be addressed.

⁴⁵⁶ Bradley (1876), p. 40.

⁴⁵⁷ James (1890), p. 359.

⁴⁵⁸ James (1890), p. 354.

⁴⁵⁹ Ryan (1974), p. 226.

⁴⁶⁰ Hamilton (1998), p. 165.

3.6 Helmholtz's Empiricism

In considering Helmholtz's theory of perception, it soon becomes clear that it resonates in important ways with the psychological accounts of the object as presented by Hume and Mill, at least insofar as Helmholtz conceives of the perceptual process as an *a posteriori* constructive mental process that is founded in previous experience. Based on this observation, Boring, for example, has argued that there is sufficient evidence to claim that "he [Helmholtz] belongs [...] systematically more with British thought than with German, in the tradition of John Locke down to the Mills [...]" and that Helmholtz's theory resonates in important respects with Mill's psychological theory of the belief in the external world.⁴⁶¹ Hochberg likewise assimilates Helmholtz's psychology of the object entirely to Mill's approach by discussing it as the 'Helmholtz-Mill' theories of perception.⁴⁶² Finally, Meulders, in his turn, considers Helmholtz to be a "remote disciple of the English empirical school."⁴⁶³ As will be argued in the next section, there are indeed compelling arguments to read Helmholtz's work on perception against the background of British and Scottish empiricism. It should be noted, however, that despite the textual evidence in support of Helmholtz's indebtedness to Mill, Helmholtz was defiant of Hume's scepticism, or his "complete negation of the possibility of objective knowledge."⁴⁶⁴ Notwithstanding his rejection of the Scottish philosopher's sceptic outlook, however, Helmholtz's work certainly bears the traces of the naturalized approach to the mind, and therefore can be read as an intellectual heir of Hume's program for a science of man, as suggested by Hatfield, among others (see section 3.1).

3.6.1 The Object and Psychological Construction

Most generally, Helmholtz's psychology of the object can be interpreted as a continuation of the empiricist tradition, insofar as he (i) conceives of the perceptual object as a complex – as opposed to a simple, intuitive, unanalyzable – mental phenomenon, which can hence be (ii) decomposed into more basic elements (sign-sensations) and (iii) reconstructed according to general mental laws.⁴⁶⁵ Based on his

⁴⁶¹ Boring (1950), p. 304.

⁴⁶² Hochberg (2007), p. 331.

⁴⁶³ Meulders (2010), p. 143.

⁴⁶⁴ Helmholtz (1867 [1856/1866], III), p. 455 [my translation]; Schiemann (2009), p. 70.

⁴⁶⁵ For a discussion of the way in which Helmholtz's psychology of the object aligns with the empirical tradition, see for example Boring (1950), Hatfield (1990) and Schiemann (2009).

physiological epistemology (see chapter 2), Helmholtz argues that perceptions, defined as “representations of the existence, form and position of external objects”, are mental acts, and that it is the task of psychology to investigate the nature and structure of the psychological activity involved in the transition of the sign-sensation and their meaning-objects, and to determine its laws.⁴⁶⁶ To this end, Helmholtz somewhat reluctantly adds, we cannot rely on “a method founded in generally accepted and clear principles,” but have to resort mainly to self-observation.⁴⁶⁷ Nevertheless, in combination with physical and physiological research on the sensory apparatus, this method should enable the formulation of general laws governing the perceptual process that transcend individual differences and aberrations.

As already explained in the previous chapter, Helmholtz mainly uses the term ‘empiricism’ to differentiate his psychological account from physiological reductionism or nativism, and consequently conceives of the perceptual process as an *a posteriori* constructive activity, based on previous experience.⁴⁶⁸ In defending his approach, a certain programmatic similarity to the rhetorical strategies used by Mill to refute intuitionism and nativism cannot be denied: both defend the psychological method as having greater explanatory power, being more parsimonious, and free from metaphysical presuppositions (see chapter 2). Moreover, the details of Helmholtz’s account resonate in important respects with Mill’s theory of the genesis of the belief in external existence in terms of *permanent possibilities of sensation*.⁴⁶⁹

“To see,” Helmholtz states in 1855, is “to understand sensation.”⁴⁷⁰ Accordingly, the task of psychology can be reformulated as an attempt to grasp the general nature and structure of *perceptual understanding*. To explain the general rationale underlying his empirical theory of perceptual understanding, Helmholtz frequently invokes the example of language acquisition and comprehension as an *analogon* to the perceptual process:⁴⁷¹

An instructive example is the comprehension of our native language. This knowledge is not inborn; [...] we have acquired our mother tongue by learning, that is, by usage through frequently repeated experience. [...] The child hears the usual name of an object pronounced again and again when it is shown or given to him, and constantly hears the same change in the visible environment described

⁴⁶⁶ Helmholtz (1867 [1856/1866], III), p. 427.

⁴⁶⁷ Helmholtz (1867 [1856/1866], III, p. 427; 1896, III, p. 576) [my translation].

⁴⁶⁸ See section 3.6.

⁴⁶⁹ Boring (1950); Hochberg (2007).

⁴⁷⁰ Helmholtz (1896 [1855]), p. 100 [my translation].

⁴⁷¹ Helmholtz (1968 [1894]), p. 250. Also see Helmholtz (1995 [1868, 1869, 1878b]).

with the same word. Thus the word becomes attached to the thing in his memory [...] [A]t the beginning we still remember the individual cases where we have heard it used. Later [...] we are no longer able to recount under what particular circumstances we came to this knowledge [...].

In the same manner, Helmholtz states, sensations are “signs which we have learned to decipher” through experience.⁴⁷² More particularly, we learn to interpret sensation-signs through the repeated experience of a lawlike covariation between voluntary movement and the coming into being of certain sensations:⁴⁷³

Let us call the entire group of aggregate sensations induced [...] by a certain definite and finite group of the will's impulses the ‘current presentables’; by contrast, let us call ‘present’ the aggregate of sensations from this group which is just coming to perception. Our observer [...] can make each individual presentable present to himself at any moment through execution of the relevant movement. In this way it seems to him that each individual from this group of presentables exists at each moment during this period of time. [...] Thus the idea of a simultaneous and continuous existence of different things alongside one another will be achieved.

In somewhat less abstract terms, Helmholtz explains the basic dynamics underlying the perceptual process as hypothesized by his empirical theory as follows:⁴⁷⁴

We become acquainted with their [i.e. the sensations] meaning by comparing them with the result of our own movements, with the changes which we thus produce in the outer world. [...] [T]he child learns to recognize the different views which the same object can afford, in connection with the movement he is constantly giving it [...]. When we have obtained an accurate conception of the form of any object, we are then able to imagine what appearance it would present, if we looked at it from some other point of view.

In other words, the notion of the object emerges from the experience of a constant, lawlike relation in the succession of sensible qualities, discovered through voluntary movement and active experimentation. Subsequently, the knowledge of lawlikeness gives rise to the hypothesis of a continuous and independent existence as the cause of sensible variation.⁴⁷⁵ To understand sensation, for Helmholtz, is thus the same as to

⁴⁷² Helmholtz (1995 [1869]), p. 222.

⁴⁷³ Helmholtz (1995 [1878b]), p. 350.

⁴⁷⁴ Helmholtz (1995 [1868]), p. 195.

⁴⁷⁵ See Helmholtz (1995 [1878b]), p. 361: “The first product of the reflective understanding of a phenomenon is the law-like. If we [...] become convinced that it [...] will maintain itself in all times and in all cases, then we

determine the uniform law that regulates the succession of sensible events.⁴⁷⁶ In the end, to *represent* an object, according to this theory, comes down to the acquired ability to imagine “the whole series of sensible impressions that would be had in such a case.”⁴⁷⁷ The most general rule underlying the perceptual process, Helmholtz therefore specifies, is that “such objects are always imagined as being present [...] as **would have to be there** in order to produce the same impression on the nervous mechanism [...]”⁴⁷⁸ Not unlike Mill, in Helmholtz’s theorizing the notion of the object is the associative compound of possible sensations, or a generative hypothesis pertaining to expected contingencies, that is projected onto the visual field and as such, gives rise to the experience of a world *out there*.

This, in short, is the basis of Helmholtz’s theory of perception as unconscious inference, or his ‘projection theory’ of perception: it is the unconscious application of a general law (the major premise) to a particular sensible event.⁴⁷⁹ In accordance with Helmholtz’s empirical outlook, the major premise in this unconscious inferential process must be further specified as a law of experience [Erfahrungssatz] that pertains to acquired knowledge about the covariation between voluntary movement and the coming into being of certain sensations, or, in short, an acquired idea of an object (conceived of as a generative hypothesis).⁴⁸⁰ Consequently, Helmholtz writes:⁴⁸¹

recognize it as something existing independently of our ideas, and we call it cause, i.e. that which, behind the change, is the originally abiding and existing.” Also see Helmholtz (1867 [1856/1866], III), p. 452 [my translation]: “We explain the table as existing [daseiend] independently of our perception, since we can observe it at any possible time, by putting ourselves in the proper position.”

⁴⁷⁶ Helmholtz’s conception of perceptual understanding thus mirrors his idea of scientific understanding, which he likewise defines in terms of the determination of general laws. See for example Helmholtz (1889 [1847], 1995 [1869, 1878b, 1891]). For the significance of Helmholtz’s conception of lawlikeness in his philosophies of science and perception, see among others Heidelberger (1993), Krüger (1994) and Schieman (2009).

⁴⁷⁷ Helmholtz (1995 [1870]), p. 229.

⁴⁷⁸ Helmholtz (1925 [1856/1866], III), p. 2 [boldface added].

⁴⁷⁹ The specifically projectivist understanding of objectification in perception was already apparent in Hume’s account of ideas (like that of causality, or the notion of existence) as products of the mind’s “propensity to spread itself on external objects.” See Hume (1969 [1739/40], p. 217; Kail, 2007). Interestingly, Makari (1994) suggests that Freud’s theory of transference was actually based on Helmholtz’s theory of perception as unconscious inference.

⁴⁸⁰ Helmholtz (1867 [1856/1866], III), p. 447. Helmholtz (1925 [1856/66, III], p. 26) gives the following example: “When those nervous mechanisms whose terminals lie on the right-hand portions of the retinas of the two eyes have been stimulated, our usual experience, repeated a million times all through life, has been that a luminous object was over there in front of us on our left. We had to lift the hand toward the left to hide the light or to grasp the luminous object; or we had to move toward the left to get closer to it. Thus while in these cases no particular conscious conclusion may be present, yet the essential and original office of such a conclusion has been performed [...] simply, [...] by the unconscious processes of association of ideas [...]”

⁴⁸¹ Helmholtz (1867 [1856/1866], III), p. 436 [my translation].

Hence we see how memory images from previous experiences cooperate with present sensations, in order to produce a perceptual image, that imposes itself [...] with such force, without our being conscious of how much of it was produced through memory, and what was given in present perception.

Perceptual judgments, according to Helmholtz, can be treated as being similar *in result* to conscious forms of inductive reasoning, although we can never be sure that the underlying processes are entirely identical, due to their non-observable nature.⁴⁸² Scientific as well as perceptual understanding – which Helmholtz denotes respectively as discursive *Wissen* [knowledge] and non-discursive *Kennen* [cognizance or familiarity] – both involve the determination of a sensible manifold based on previous experience, but whereas the former proceeds according to the objective, logical principles of thought, the second unfolds in the opaqueness of the unconscious, and can therefore only be hypothesized to have a quasi-logical structure.⁴⁸³ Furthermore, in contrast to logical forms of reasoning, unconscious inductions take place “without reflection, without mental effort from the moment that a sensation affects us.”⁴⁸⁴ The finality of both scientific and perceptual understanding, however, is the subsumption under an acquired notion of lawlikeness.⁴⁸⁵

To find the law by which they are regulated is to understand [begreifen] phenomena. For law is nothing more than the general conception [begriff] in which a series of similarly recurring natural processes may be embraced.

Helmholtz summarizes his psychological theory as follows:⁴⁸⁶

[W]e can never emerge from the world of our sensations to the apperception of an external world, except by inferring from the changing sensation that external objects are the causes of this change. Once the idea of external objects has been

⁴⁸² See Helmholtz (1867 [1856/1866], III), p.430 [my translation]: “The psychological activity [psychischen Thätigkeiten] by virtue of which we judge that a determinate object of a determinate character is present at a determinate place, is [...] not conscious, but unconscious. It is similar to a conclusion in its result, to the extent that the observed effect [Wirkung] on our sensibility enables us to form an idea as to the possible cause of this effect [...]. [...] [W]hile it is true that there has been, and probably always will be, a measure of doubt as to the similarity of the psychological activity in the two cases, there can be no doubt as to the similarity between the results of such unconscious conclusions and those of conscious conclusions.” Also see Helmholtz (1995 [1878b], 1892, 1896).

⁴⁸³ For Helmholtz’s distinction between knowledge and cognizance – the latter denoting an unconscious form of empirically acquired familiarity with the lawlike covariation between voluntary movement and the coming into being of certain sensations – see Helmholtz (1969 [1894], p. 251; 1995 [1868], p. 198, 200).

⁴⁸⁴ Helmholtz (1896 [1892]), p. 341.

⁴⁸⁵ Helmholtz (1995 [1869]), p. 208.

⁴⁸⁶ Helmholtz (1925 [1856/1866], III), p. 32.

formed, we may not be concerned any more as to how we got this idea, especially because the inference appears to be so self-evident that we are not conscious of its being a new result.

“This,” Helmholtz concludes, “is the solution to the riddle of how it is possible to see”.⁴⁸⁷

The correspondence [...] between the external world and the Perception of Sight rests, [...] upon the same foundation as all our knowledge of the actual world – on experience, and on constant verification of its accuracy by experiments which we perform with every movement of our body [...].

Helmholtz’s treatment of the perceptual process as an inductive judgment implies that it is essentially fallible. Illusions, in Helmholtz’s thought, are essentially wrong applications of unconscious *Kennen* (the major premise in unconscious inductions). In other words, illusory experience can be ascribed to a flawed inductive judgment, in which sensation-signs are tied together inadequately on the basis of expected lawlikeness, that is consequently projected onto the visual field.⁴⁸⁸

The explanation of the possibility of illusions lies in the fact that we transfer the notions of external objects, which would be correct under normal conditions, to [...] unusual circumstances [...]. The simple rule for all illusions of sight is this: we always believe that we see such objects as would, under conditions of normal vision, produce the retinal image of which we are actually conscious.

In other words, the underlying dynamics of subnormal perception are identical to those of normal (veridical) perception; illusory experience is not due to a deviance in the perceptual process itself, but should be ascribed to a misapplication of a normal mode of perceptual interpretation. At this point, the parsimonious nature of Helmholtz’s theorizing becomes especially clear: the psychological dynamics underlying perception and illusion are one and the same.

More importantly, however, the inductive nature of the perceptual process has serious repercussions on Helmholtz’s notion of truth or objectivity. More in particular, what we consider to be objective (in perception as well as in science), according to him, is but a fallible inductive hypothesis based on previous experience, and hence, only has practical (as opposed to absolute) value.⁴⁸⁹ Helmholtz’s empirical theory thus leads him directly to a pragmatic notion of truth. As a consequence of his empirical theory, he writes, “it follows, [...] that we are only warranted in accepting the reality of this

⁴⁸⁷ Helmholtz (1995 [1868]), p. 202.

⁴⁸⁸ Helmholtz (1995 [1868]), p. 197.

⁴⁸⁹ See Helmholtz (1867 [1856/1866], III), p. 443 [my translation]: “I believe, that there can be no possible sense in speaking of any other truth of our ideas except a practical one.”

correspondence [between perception and the external world], [...] for practical purposes.”⁴⁹⁰ Elsewhere, Helmholtz states that “we call our representations of the external world true, when they inform us sufficiently about the consequences of our actions [...] and allow us to draw right conclusions about the changes to expect.”⁴⁹¹ As such, Helmholtz’s semiotic understanding of the subject-object relation amounts to an epistemology in which the concept of objectivity is to be understood as an infinite and fundamentally incomplete process of interpretation or objectification.

In conclusion, if we restrict ourselves to the empirical level of analysis, Helmholtz combines all of the elements of the empiricist methodological naturalistic project with regard to the mind, and especially resonates with Mill’s theorizing. Helmholtz acknowledges he was in fact inspired by Mill – who according to him “gave the best explanation” of the nature of inductive conclusions [Inductiven Schlüsse]⁴⁹² – in his formalization of the inductive process underlying perception. More importantly, however, Helmholtz’s psychology of the object comes quite close to Mill’s theory of the belief in externality as the permanent possibility of sensation, as Boring (1950) and Hochberg (2007) note: to ‘see’ an object means to have the conditional certainty, based on experience, that under a certain set of conditions, certain sensations can be made present.⁴⁹³ Finally, Helmholtz’s theory contains a further elaboration of Mill’s principle of obliviscence, in hypothesizing that the apparent intuitive and unmediated character of the phenomenal can be ascribed to the unconscious nature of its formative history in the mind.

In contrast to Hume and Mill, however, and contrary to Boring’s argumentation, Helmholtz’s psychology of the object exceeds the framework of methodological naturalism by far, and as such, is not condemned to its aporetic corners with regard to the questions of synthesis and unity in experience.

⁴⁹⁰ Helmholtz (1995 [1868]), p. 202. For a discussion of Helmholtz’s pragmatism, see for example Turner (1982), Hamner (2002) and Lenoir (1993).

⁴⁹¹ Helmholtz (1894), p. 590.

⁴⁹² Helmholtz (1867 [1856/1866], III), p. 447.

⁴⁹³ This is the motive behind Hochberg’s (2007, p. 331) assimilation of Helmholtz’s and Mill’s theorizing: both, he claims, define perception in terms of expected contingencies. Boring (1950) likewise noted this similarity between Helmholtz’s and Mill’s theorizing.

3.6.2 Overcoming the Labyrinth: Helmholtz's Intellectual Leap

At least two major programmatic differences can be pointed out between the third part of Helmholtz's physiological inquiry of perception, and Mill's psychological endeavor, namely (i) that the former, in contrast to the latter, acknowledges that there is a generic difference between the *Geisteswissenschaften* and the natural sciences, and (ii) their respective attitudes towards German idealism in general, and towards Kant's philosophy project in particular. Through a brief discussion of these crucial differences, we will clear the way for a consideration of other levels of analysis in Helmholtz's theorizing, which transcend his methodological naturalism, and, as such, create the opportunity to overcome the inextricable difficulties associated with the pure empiricist psychology of the object.

3.6.2.1 Helmholtz and the Specificity of the *Geisteswissenschaften*

There has been considerable disagreement over whether Helmholtz is on a par with Mill in his conception of the relation between the natural sciences and the *Geisteswissenschaften*. In contrast to Hatfield, for example, Gadamer claimed that Helmholtz's methodological assimilation of the science of mind and natural science had no restrictions.⁴⁹⁴ Helmholtz does make some rather trivial statements about the 'generic difference' between the natural sciences on the one hand, and the science of mind on the other, e.g. that the former, in contrast to the latter, deals with "richer material," and that its object (the mind and its processes) poses some serious methodological problems. In themselves, however, these remarks do not prevent a view of psychology as a science whose limits are determined by the limits of naturalistic explanation, leaving the remainder up to philosophical speculation. Consequently, these comments do not allow for a conclusive answer to the question concerning the extent of Helmholtz's assimilation of both fields of inquiry.

There is however, one significant element in Helmholtz's theorizing that implies a denial of the possibility of a complete reduction of the *Geisteswissenschaften* to naturalistic modes of explanation, i.e. Helmholtz's assumption that mental processes, in contrast to natural entities and events, are not (entirely) subject to deterministic,

⁴⁹⁴ See Hatfield (1993), p. 544: "Although he [Helmholtz] may have appropriated the terminological distinctions between the Natur- and *Geisteswissenschaften* from the German version of Mill's *Logic*, he did not adopt Mill's construal of the relation between the two areas of study.[...] In contrast to Mill [...] Helmholtz contrasted the natural and moral sciences in terms of both their subject matter and their characteristic modes of thought. [...] [H]e believed that real methodological differences separate the two areas of investigation." Gadamer (2006 [1975], p. 7), by contrast, claimed that Helmholtz was on a par with Mill in the complete assimilation of the *Geisteswissenschaften* to the natural sciences.

mechanical causality. To be precise, Helmholtz's theory of perception proceeds from the "essential assumption" that the "will's impulse has neither already been influenced by physical causes, which simultaneously determine the physical process, nor itself psychically influenced the succeeding perceptions."⁴⁹⁵ So, while Helmholtz, to some degree, modeled his approach to the perceptual process on the modes of explanation associated with the natural sciences, at the same time he maintained that "in ascribing to ourselves free-will [...] we deny *in toto* the possibility of referring at least one of the ways in which our mental activity expresses itself to a rigorous law."⁴⁹⁶ Contrary to Mill, whose *Science of Man* was founded on the doctrine of philosophical necessity, stating that "the law of causality applies in the same strict sense to human actions as to other phenomena," Helmholtz's psychology of the object hinges on the assumption of an unconditioned, autonomous impulse of the will as a constitutive element of the perceptual process.⁴⁹⁷

With this shift from the constructive factors of experience to constitutive elements – or from natural to normative analysis – Helmholtz oversteps the strict empiricist framework, and his thought begins to resonate with the transcendental tradition. This 'transgression', so to speak, was less problematic for Helmholtz than it was for Mill, as the former never juxtaposed the *a posteriori* school of philosophy with transcendental philosophy, but instead conceived of both as being complementary to some degree. As such, his account left room for philosophical reflection on the subjective functions that

⁴⁹⁵ Helmholtz (1995 [1878b]), p. 358-359.

⁴⁹⁶ Helmholtz (1995 [1862]), p. 85.

⁴⁹⁷ See Mill (1882 [1843]), p. 581: "The question, whether the law of causality applies in the same strict sense to human actions as to other phenomena, is the celebrated controversy concerning the freedom of will [...]. The affirmative opinion is commonly called the doctrine of necessity, as asserting human volitions and actions to be necessary and inevitable. The negative maintains that the will is not determined, like other phenomena, by antecedents, but determines itself; that our volitions are not, properly speaking, the effects of causes, or at least have no causes which they uniformly and implicitly obey. I have already made it sufficiently apparent that the former of these opinions is that which I consider the true one [...]." We should add that this application of the law of causality to human volition, in Mill's work, does not in the least eliminate the feeling of moral freedom itself. Rather than defending determinism, Mill argues for compatibilism in the introduction to the sixth volume of his *A System of Logic*. A complete discussion of Mill's theory of free will falls, however, outside of the scope of this discussion. What is relevant to us here, is that Mill's argument for the universal applicability of the law of causality to human action contradicts Helmholtz's insistence on the autonomous and unconditioned nature of the will's impulse. This interpretation contradicts Steege (2012, p. 167-170), who puts Helmholtz and Mill on a par with regard to the question of free will. However, I believe this interpretation is based on an insufficient appreciation of the constitutive role of the will's impulse in Helmholtz's thought, as laid down particularly in Helmholtz (1995 [1878b, 1892]). Steege (2012), however, is by no means the only one that fails to take into account this aspect of Helmholtz's theorizing, as will be argued in chapter 5.

are to be presupposed at the basis of the empirical construction of reality in perception. This brings us to the second programmatic difference between Helmholtz and Mill.

3.6.2.2 Helmholtz and the German idealist tradition

The rhetorical strategies used by Helmholtz to argue for the superiority of the empiricist account over nativism bear a strong programmatic similarity with the polemical structure of Mill's defense of empirical psychology against the *a priori* school of philosophy, but there is a major difference between both authors with respect to their attitude towards German critical philosophy. More particularly, whereas the English empiricist defined his approach *in opposition to* critical philosophy, this was never the case with Helmholtz.⁴⁹⁸ Quite the contrary. As is clear from his 1892 lecture, Helmholtz did not so much intend to refute the critical system, but rather to *rethink* it, by redrawing the border between the *a priori* and the *a posteriori*, or the formal and material aspects of experience:⁴⁹⁹

[T]he physiological investigation of the sense organs and their activity [...] agree with Kant; indeed, already in the physiological field there are the clearest analogies to Kant's transcendental aesthetic. However, an objection [...] had to be raised against the borderline that Kant had drawn between the facts of experience and the forms of intuition given *a priori*. And with the required redrawing of the border [...] the fundamental principles of spatial theory are subsumed under the facts of experience.

Elsewhere, Helmholtz likewise states that⁵⁰⁰

Kant's theory of the *a priori* given forms of intuition is a very apt and clear expression of the relation of things; but these forms must be without content and

⁴⁹⁸ See for example Mill (1882 [1843]), p. 579: "Principles of evidence and theories of method are not be constructed *a priori*. The laws of our rational faculty, like those of every other natural agency, are only learned by seeing the agent at work." Mill's criticism against *a priori* psychology can also be found in Mill (1867 [1859]), p. 97–152.

⁴⁹⁹ Helmholtz (1995 [1892]), p. 407.

⁵⁰⁰ Helmholtz (1883 [1878a]), p. 660 [my translation]. In this context, Helmholtz's 1857 correspondence with his father over the work of Immanuel Hermann Fichte is also very interesting. In this correspondence, Hermann von Helmholtz expresses his interest in, and his consent to, his father's interpretation of the latter's work as a plea for the critical idea that "The comprehension of nature presupposes an interaction [Wechselwirkung] of the *a priori* ideal with the objective [...]. Thought and observation always have to cooperate to achieve knowledge [...]." Continuing, Helmholtz writes that his inquiry into the nature of perception automatically leads him to "Kant's [...] field of *a priori* concepts," which, he writes, necessarily underlie the laws of unconscious induction (Ferdinand and Hermann von Helmholtz, as quoted in Koenigsberger, 1902/03, p. 286, 292 [my translation]).

sufficiently free to assume any content [...] Kant has here, in his Critique, not been critical enough.

In short, Helmholtz's empiricism was not meant to replace Kantianism, but to correct it where it had "not been critical enough." This has enormous implications with regard to his psychology of the object. Although Helmholtz treats external perception and objectification mainly as an *a posteriori* constructive process, his theorizing contains a level of analysis that exceeds the empiricist framework, in addressing the subjective conditions of possibility for empirical construction. In sharp contrast to the empirical theories sketched above, Helmholtz's work implies a subject that is not just an empty locus of construction, but rather a function of synthesis and unity in experience.

In accordance with this shift in perspective, the subject is absolved from its indeterminable position in methodological naturalism, in order to be established as the locus of empirical determinability. To introduce these further levels of analysis in Helmholtz's psychology of the object, it will be helpful to take his semiotic understanding of the subject-object relation as a point of departure. The levels at stake can then be conceived of as pertaining, not to the structure of perceptual comprehension, but to the principles of comprehensibility.

First of all, there is the question concerning the foundation of sensation *qua* sign. In other words, how is it that the physiologically neutral event of sensation forms the basis of grasping something (internal or external) that is not sensation itself? And how is it that a group of essentially disparate sensations come to be ordered in such a way as to give rise to the idea of a unitary cause? It is true, Helmholtz states, that we "have learned to see," i.e. "we have learned to link certain representations to certain sensations," and that from this (empirical) perspective, perception is "nothing but a mechanically acquired association of ideas."⁵⁰¹ But we need to take "one more step [einen letzten Schritt]," he immediately adds, as empirical analysis should necessarily be paired with an account of "what **first** enables us to pass from the world of nervous sensations into the world of actuality [Welt der Wirklichkeit]?"⁵⁰² In other words, how did we first come to grasp (groups of) sensations as signs, given their fundamentally underdetermined nature with regard to external objects? At this level, Helmholtz thus interrogates the necessary principle of synthesis, or, in psychologistic terms, the motive for empirical association.

Second, Helmholtz addresses the question of how it is that one can differentiate between those signs referring to external objects or events, and those that are endogenous in origin. "What is it," he asks, that "**first** makes the distinction between

⁵⁰¹ Helmholtz (1896 [1855]), p. 114-115 [my translation].

⁵⁰² *Ibid.*, 115-116 [boldface added].

thought and reality possible [Scheidung von Gedachtem und Wirklichem erst möglich wird]?”⁵⁰³ At this point we touch on the important problem concerning the foundation of the unity of experience, or the foundation of ownership of experience, as well as the differential consciousness of the I and the Not-I. From a systematic point of view, these complementary levels of analysis in Helmholtz can be considered as attempts to overcome the yawning gaps in the strict empiricist psychology of the object, produced by the restrictiveness of the naturalistic framework.

Helmholtz’s so-called dovetailing between empiricism and rationalism takes a start when he supplements his naturalistic analysis with the appropriation of the Kantian idea of the *a priori* causal structure of understanding to address the first problem, and the Fichtean elaboration of the self-referential structure of the *I think* to address the second. Although the former has received the most attention by far in the secondary literature, I will argue in the following chapters that both levels of analysis ought to be taken into account, although neither one can be considered as an identical replication of the Kantian and Fichtean arguments from which they are derived.

3.7 Summary and Conclusion

In this chapter, we have offered a historical-systematic analysis of the empirical dimension in Helmholtz’s psychology of the object. The historical framework for this analysis was outlined by taking Hume’s and Mill’s proto-psychological analyses as a point of departure. Subsequently, Helmholtz’s theory of perception as unconscious inference was systematically analyzed against the background of empirical philosophy. It was argued that Helmholtz’s theorizing is continuous with Hume’s and Mill’s, to the extent that the former considered the perceptual object as arising from a projection of meaning onto the visual field. A ‘meaning’ that is generated from the lawlike combination of sensations and previous experience. Furthermore, we have illustrated the peculiarities of this empirical approach by contrasting it with the common-sense accounts of the object, as prototypically represented in the philosophies of Thomas Reid and William Hamilton.

On the other hand, empiricism’s ‘abysmal failure’ with regard to the problem of subjectivity was discussed extensively. In this discussion, we took Hume’s *Labyrinth* as a point of departure. It was argued that Hume’s failure to produce a satisfactory account

⁵⁰³ Helmholtz (1995 [1878b]), p. 242 [boldface added].

of the Self was a logical consequence of his empiricist methodology. Furthermore, Hume's retraction of his bundle-theory of the Self not only revealed the limits of the empiricist framework, but more importantly confronted us with a fatal incoherence at the heart of his psychology of the object, i.e., its inadequacy of accounting for one of its most essential presumptions: the constructing subject. As was explained, this failure ultimately undermined Hume's entire account of experience, as it left him without a means to make sense of the foundational principles of association, and the unity of experience. As Strawson aptly described it in his recent analysis of Hume's failure:⁵⁰⁴

Hume applies his empiricist principles to the idea of the mind or self [...]. Within a year, Hume sees that he can't maintain the view that this is the true idea of the mind, although his empiricist principles commit him to the view that it is. [...] he sees that it's not the idea of the mind that he's worked with in his philosophy, although his empiricist principles commit him to working with no other. This is his problem: the empiricistically 'true' idea of the mind isn't consistent with his philosophical commitments and presuppositions considered as a whole.

And further:

He [Hume] needs what he can't have. He needs it in order to legitimate the notion of the mind he makes use of as a philosopher who, whatever else he does, can't give up the empiricism which rules out [...] the mind as illegitimate.

Indeed, the empiricist accounts of the object as discussed in this chapter, become "incoherent," "self-refuting," or "circular" at the point where they fail to account for the experiencing subject, and hence, for the synthetic unity of experience. Both Hume's and Mill's psychologically naturalistic theories of the object presuppose an active, unitary subject as the basis of their constructive accounts, which cannot, however, be integrated in their theories because of the foundational empiricist scheme itself.⁵⁰⁵ The observation that Mill's psychological account of the belief in externality reproduces Hume's labyrinth, leads one to suspect that the problem at stake is not restricted to Hume's philosophy, but in fact points to an inherent weakness of the strict empiricist framework.

As a consequence, one could argue that the problem of subjectivity – the 'labyrinth' in which Hume found himself involved, and which to Mill was an 'inexplicable mystery' – entails the 'bankruptcy' or the 'ruin' of the empiricist psychology of the object, and, at the same time, the motive for a shift towards idealism in Helmholtz's thought. Hence,

⁵⁰⁴ Strawson (2011), p. 33, 155.

⁵⁰⁵ Rocknak (2013); Strawson (2011). Also see chapter 4.

this chapter not only provided a historical-systematic framework for the interpretation of Helmholtz's psychological empiricism, it furthermore revealed a motive for transgressing that very framework. From the perspective of empiricism's abysmal failure, Helmholtz's recourse to Kant and Fichte (as discussed in the following chapters), is not at all coincidental, and still less a product of his idiosyncratic philosophical inclinations. An in-depth analysis of Hume's labyrinth – or by extension: empiricism's labyrinth – leads one to assume that strict empiricist accounts of the object require their own transgression in order to be consistent. In terms of the central problem of this dissertation, this would entail an interrogation of normative principles regulating *the constructing mind or subject*; principles that have to be accounted for in order to assign the subject a creative role in the construction of reality. Historically, it is Kant who first attempted to address empiricism's failure by taking the problem of subjectivity as the basis of his philosophical system. From a systematic viewpoint, it is at this point that Helmholtz's psychology shifts from an empirical, to a critical level of analysis. This level will be discussed in the following chapter.

Chapter 4

Helmholtz's Intellectual Leap (I): Towards a Critical Understanding of Experience

4.1 Introduction

From the problems with the strict empiricist account of the object as discussed previous chapter, a motive can be derived for supplementing or completing the empirical perspective with a critical level of analysis. First and foremost, this 'intellectual leap' to a *critique* of experience in the Kantian sense, entails a transformation of the empiricist concern with the structure of psychological construction, to an interrogation of its a priori subjective conditions of possibility .

In this chapter, we will analyse the particular way in which Helmholtz overcomes the inherent problems with empiricism by taking refuge to Kant's critical system. In doing so, we enter upon a dimension of Helmholtz's work that has been fiercely debated ever since the nineteenth century (see section 4.6). The question of Helmholtz's Kantianism is complicated by two elements in particular. On the one hand, Helmholtz was as much a indebted to Kant's philosophical project, as he was a critic of Kant. Secondly, Helmholtz appropriated elements of Kant's epistemological/logical analysis of experience within an explicitly *psychological* framework, which had quite drastic implications with regard to the interpretation of the *a priori*.

Furthermore, from the perspective of this dissertation, the Kantian dimension in Helmholtz's psychology constitutes an intermediate level of analysis between empiricism on the one hand, and Fichteanism on the other. Therefore, we are not only interested in the question of Helmholtz's adherence to Kant's critical investigation, but also in the way in which the 'aporetic corners' of Kantianism provided Helmholtz with a motive for further extending his psychological analysis along the lines set out by Fichte's Ego-doctrine. The aim of this chapter is therefore fourfold, and we will subsequently address (i) the way in which Kant's critical philosophy of experience can

be read as providing an answer to Hume's Labyrinth, (ii) the aporetic corners of Kant's analysis, (iii) Helmholtz's appropriation of certain elements of Kant's account of experience, and (iv) Helmholtz's criticism of Kant and the way in which it prompted him to push his analysis to yet a further level of analysis, as discussed in the following chapter. Hence, this chapter is organized as follows:

- (1) First, an analysis is presented of the way in which Kant's transcendental doctrines of synthesis and apperception can be read as a response to the problems related to the strict empiricist account of the object (sections 4.2, 4.3 and 4.4).
- (2) Second, the possible problems with Kant's critical analysis are discussed, with the aim of constructing a framework from which to interpret (i) Helmholtz's criticism of Kant, as well as (ii) his subsequent move to a metacritical level of analysis (section 4.5).
- (3) Third, we will investigate Helmholtz's account of perceptual comprehensibility, and its relation to Kant's first *Critique* (section 4.4). In the context of this discussion, the implications of Helmholtz's psychological appropriation of the *a priori* will be scrutinized (sections 4.6.1 and 4.6.2).
- (4) Finally, we will go into Helmholtz's criticism of Kant's transcendental theory of space, and the significance of this criticism for his theory of perception (section 4.6.3).

4.2 Kant on Hume's Labyrinth

David Hume [...] brought no light [...] but he certainly struck a spark from which light could have been kindled, if it had hit some welcoming tinder.

- Kant (2004 [1783]), p. 6.

As was argued in the previous chapter, Hume's psychological inquiry made the problem of the object especially tangible, not in spite, but rather because of the his failure to thematize the 'necessary connecting-principle' and the foundation of the unity of experience. In terms of the poetical descriptions presented in the introduction, one could say that Hume's vanishing hopes, as well as Mill's reproduction of Hume's

labyrinth, invoke the Faustian question of *What was there in the beginning* with an unforeseen urgency. A question which Husserl once called that of the world-enigma.⁵⁰⁶

What is [...] the objective world [...] once we have seen [...] with Hume [...] that 'world' is a validity which has sprung up within subjectivity [...]. The naïveté of speaking about 'objectivity' without ever considering subjectivity [...] is naturally no longer possible [...]. [...] [M]ust this liberation not come to anyone who seriously immerses himself in the *Treatise*? **The world-enigma in the deepest and most ultimate sense, the enigma of a world whose being is being through subjective accomplishment, [...] that, and nothing else, is Hume's problem.**

As such, Hume's scene of thought immediately gave rise to another one, on which the problems which the sceptic had left lingering in his *Appendix* were addressed. From the perspective of Hume's *aporia*, Kant's famous Copernican turn to the subject as the foundation of experience and knowledge is as ingenious as it seems natural and logical.⁵⁰⁷ As is well known, Kant credited Hume with awakening him from his dogmatic slumber in the *Prolegomena*, and also he described his attempt to address the question concerning the nature and structure of knowledge in the first *Critique* as "the elaboration of the Humean problem in its greatest possible amplification."⁵⁰⁸

From a Kantian viewpoint, however, Hume's problem as it was presented in the previous chapter, i.e. as pertaining to the necessary foundation of his psychological theory, is only relevant to the extent that it points to the much broader (and profounder) epistemological problem of objectivity. Hume's psychological account eventually lead to the dissolution of objective knowledge in the contingency of the constructing subject, and this dissolution was most probably what Kant took to be Hume's main problem.⁵⁰⁹ Hence, what we call 'Hume's problem', and, by extension, the

⁵⁰⁶ Husserl (1970 [1954]), p. 96-97 [boldface added].

⁵⁰⁷ *CPR* [Bxvi-xvii]: "Up to now it has been assumed that our cognition must conform to the objects; [...] let us once try whether we do not get farther with the problems of metaphysics by assuming that the objects must conform to our cognition [...]. This would be just like the first thoughts of Copernicus, who, when he did not make good progress in the explanation of the celestial motions if he assumed that the entire celestial host revolves around the observer, tried to see if he might not have greater success if he made the observer revolve and left the stars at rest."

⁵⁰⁸ Kant (2004 [1783]), p. 10-11.

⁵⁰⁹ As is well known, Kant focused especially on the validity of the causal law in this respect. See for example Kant (2004 [1783]), p. 7: "Hume started mainly from a single but important concept [...] that of the connection of cause and effect [...] and called upon reason which pretends to have generated this concept [...] to give him an account of by what right she thinks: that something could be so constituted that, if it is posited, something else necessarily must thereby also be posited; for that is what the concept of cause says. [...] [H]e concluded that reason completely and fully deceives herself with this concept, falsely taking it for her own child, when it is really nothing but a bastard of imagination, which impregnated by experience, and having brought certain

problem of strict empiricist accounts of objectification, in the scope of this investigation, is Hume's problem in the *restricted* sense: it pertains to the sceptic's failure to found his psychological theory of objectification, and not to the broader problem of the foundation of knowledge as such. Nevertheless, Kant's turn to a *quid juris* interrogation of knowledge and experience, and especially his central doctrines of synthesis and apperception, provide an effective way out of Hume's labyrinth.⁵¹⁰ In addressing the broader problem of validity, Kant at the same time responded to the restricted problem of Hume's perplexity with regard to the foundation of the associative theory of objectification. As will become clear, quite a few readings have emerged in the past decades, that concentrate on the way in which Kant's *Critique* should be read against the background of Hume's abysmal psychology of the object. These are of central interest to this investigation, as they are helpful in constructing the historical background against which Helmholtz's systematic appeal to Kant can be made insightful.

In what follows, the general tenets of Kant's transcendental analysis of experience will be outlined, as well as the way in which it can be read as a response to the problems that were discussed in the previous chapter. In accordance with the aims of this investigation, however, the subsequent inquiry will be limited in two ways. More particularly, the next sections will only elaborate on those tenets and aspects of Kant's critical system that can be useful in pinpointing (i) the systematic significance of Helmholtz's appeal to Kant in his theory of objectification, as analyzed from the correlative problem of subjectivity, and (ii) the scope and purport of Helmholtz's appropriation of specific elements of Kant's theorizing. This way of limiting our inquiry is necessary so that we may navigate our way through the Kantian system, and it will prevent us from obfuscating matters by indulging in exegetical problems that are not relevant for our purposes, which, in the case of Kant scholarship, are numerous.

representations under the law of association, passes off the resulting subjective necessity (i.e. habit) for an objective necessity (from insight)."

⁵¹⁰ For Kant's distinction between 'quid juris' and 'quid facti' analyses of the foundation of experience and knowledge, see CPR [A84-B116]: "Jurists, when they speak of entitlements and claims, distinguish in a legal matter between the questions about what is lawful (*quid juris*) and that which concerns the fact (*quid facti*), and since they demand proof of both, they call the first, that which is to establish the entitlement of the legal claim, the deduction." One could say that Kant's crucial gesture, if it comes to the insurmountable problems that surface in Hume's appendix, was to transform what Hume thought to be a factual question into a normative one, which can hence not be demonstrated through induction, but has to be deduced through transcendental analysis.

4.3 Kant's Analysis of Experience: Preliminary Remarks

Before embarking upon this analysis, some preliminary remarks are in order. It is important to make clear, for example, that there is a crucial difference between Kant's and Hume's conception and rhetorical use of the concept of 'mind'. Although it has been argued that Kant found his way out of Hume's *Labyrinth* by examining the formal features of the *Gemüth*, or, as Kitcher argues, by centralizing the *quid juris* question of *what the subject must be like* in order to produce objective experience, the former's philosophical project is certainly not an inquiry into the Humean mind.⁵¹¹ That is to say, while Hume's mind denotes both the empirical faculty of association and construction, and the metaphorical space (the 'theatre') in which these constructions are carried out, Kant's *Gemüth* is a *pure principle* of experience, and as such, it has a transcendental sense.⁵¹² The notion refers to the totality of *a priori* powers [Vermögens], active and passive, that is to be presupposed in a being that is capable of knowing and experiencing objects. As such, its characterizations pertain to necessary conditions, as opposed to the contingent features of Hume's mind.

More importantly, however, it should be made clear from the start that while Kant's transcendental analysis of experience unfolds from a critical inquiry into the subjective foundations of experience, it does not in the least present a *theory of the subject*.⁵¹³ On the contrary, in Kant's technical use of the term, "the subject is not a thing, but an idea."⁵¹⁴ It is no more than an *empty concept* [ens rationis] that denotes the transcendental idea of "the determining Self (the thinking)," as "that which I must presuppose in order to cognize an object."⁵¹⁵ As Kant puts it elsewhere, the "transcendental subject of thoughts = x," is not knowable as such, but nevertheless, it is that around which the entire *Critique*

⁵¹¹ Kitcher (1990), p. 63; also see Brook (1994), p. 25. For other interesting readings of Kant's *Critique* from this perspective, see Kitcher (1982, 2011), Ameriks (1982), Powell (1990), Marshall (2010) and Stevenson (2012).

⁵¹² See for example Kant (2006 [1796/97]), p. 29: "In regard to the state of its representations, my mind [Gemüth] is either active and exhibits a faculty (facultas), or it is passive and consists in receptivity (receptivitas). A cognition contains both joined together, and the possibility of having such a cognition bears the name of cognitive faculty." It should be noted that one could hold the Kantian term 'Gemüth' to be much broader than the tentative definition that is proposed here. Eisler (1984, p. 182), for example, states that the *Gemüth* covers the three foundational parts [Grundstücke] of transcendental philosophy, as analysed in the three *Critique*'s, i.e. the faculty of knowledge, the feeling of pleasure and displeasure, and the faculty of desire. From this definition, it follows that the whole of transcendental philosophy is about *Gemüth*. As we are only interested here in the way in which it is relevant to Kant's discussion of the problem of the object, the term will be used in a restrictive sense, i.e. as the transcendental faculty of cognition.

⁵¹³ See for example Ameriks (1982) and Stevenson (2012).

⁵¹⁴ Kant (1993 [1804]), p. 175.

⁵¹⁵ CPR [B404-A292/B348], [A402].

circles [welches wir uns daher in einem beständigen Zirkel herumdrehen].⁵¹⁶ As such, Kant's 'subject' is nothing but a "formal requirement of having and thinking about representations," as Brook notes, "roughly on a par with putting 'it' in 'it is raining'."⁵¹⁷ If we remain faithful to Kant's technical use of the term, the critical analysis of experience cannot be called a positive theory of the subject, although the elusive subject = x constitutes the transcendental horizon, so to speak, of the inquiry into the *Gemüth*.

Contrary to the very careful and altogether rather sparse use of the term 'subject', the *Critique* is replete with references to the *subjective*, as specifications of the conditions of the necessary organization of the *Gemüth*. As such, Kant's investigation into what the mind must be like could well be called a *theory of subjectivity*, as long as one keeps in mind that the subject implied in that statement is nothing but the empty referent of the critical project.

Before going into the relevant features of Kant's transcendental analysis of the *Gemüth*, or his theory of subjectivity, the reader should be reminded of the general aim, method and structure of Kant's critical inquiry. Although the basic tenets of Kant's first *Critique* and its epoch-making attempt to address the question *What can I know* have become commonplace since its publication, this quick recapitulation is necessary in light of the discussions to follow.⁵¹⁸

Kant famously defined his transcendental project as being "occupied not so much with objects but rather with our *a priori* concepts of objects in general."⁵¹⁹ More particularly, the first *Critique* approaches the question of objectivity not by means of an inquiry into its factual basis (i.e. its constructive conditions in experience), but on the contrary, through an analysis of its *a priori* necessary constitutive elements on the level of the knowing subject. This shift from construction to constitution, or from questions *quid facti* to questions *quid juris*, correlates with a decentralization of the problem of empirical *determination*, in favor of a focus on the problem of *determinability*, which is articulated in accordance with the way in which possible objects of knowledge conform *a priori* to the structure of the 'two stems of knowledge', i.e. sensibility and

⁵¹⁶ CPR [B404].

⁵¹⁷ Brook (1994), p. 238.

⁵¹⁸ The question concerning the foundation of knowledge, is one of the four problems that Kant aims to address throughout his three *Critique*'s and the *Anthropology from a Pragmatic Point of View*. See Kant (1992 [1800]), p. 538: "The field of philosophy [...] can be brought down to the following questions: 1. What can I know? 2. What ought I to do? 3. What may I hope? 4. What is man? Metaphysics answers the first question, morals the second, religion the third, and anthropology the fourth."

⁵¹⁹ CPR [A11].

understanding.⁵²⁰ The question of *determinability* is thus further specified as pertaining to the conditions by virtue of which the object can be given in sensibility and can be conceptually determined by the faculty of understanding. The transcendental perspective requires that both these faculties, which respectively denote the passive and the active side of the *Gemüth* (mind), are examined in abstraction of empirical content, and characterized in their capacity of *pure form*, as Kant respectively does in his *Transcendental Aesthetics* and his *Transcendental Logic*. While the former sets out to prove that no object can be *given* to sensibility if it is not given in space and time – both of which are hence established as the pure forms of intuition – the latter deduces and analyzes the categories (quantity, quality, modality and relation) as the necessary *a priori* forms of understanding. Consequently, Kant determines every possible object of knowledge or experience *a priori* as the product of the synthetic operations of receptivity and spontaneity, or of the *passive* and *active* powers of the mind. “Experience,” Kant states, “is [...] the [...] product that our understanding brings forth as it works on the raw material of sensible sensations.”⁵²¹

The overturning of the empiricist model of knowledge in Kant’s critical analysis is achieved mainly by the conceptual coupling of *necessity* and *objectivity*. More specifically, the philosopher’s most innovative contribution to the problem of knowledge was his transcendental deduction of the objective validity of concepts (e.g. causality), from their *a priori* universal necessity with regard to the possibility of experience and knowledge (i.e. their status as conditions of *determinability*).⁵²² Hence, the demonstration of the objective validity of the categories of understanding, as outlined in *Deduction of the Pure Concepts of the Understanding*, succeeds on the condition that “we can prove that by means of them alone an object can be thought.”⁵²³

In the A-edition of the *CPR*, Kant introduces his deduction as an attempt to address two interrelated questions, which he respectively calls an objective, and a subjective deduction:⁵²⁴

⁵²⁰ *CPR* [A15/B29]: “[T]here 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.”

⁵²¹ *CPR* [A1].

⁵²² See for example Kant (2004 [1783]), p. 51: “Objective validity and necessary universal validity (for everyone) are [...] interchangeable concepts, and although we do not know the object in itself, nonetheless, if we regard a judgment as universally valid and hence necessary, objective validity is understood to be included. Through this judgment we cognize the object (even if it otherwise remains unknown as it may be in itself) by means of the universally valid and necessary connection of the given perceptions.”

⁵²³ *CPR* [A97].

⁵²⁴ *CPR* [Axvii].

One side refers to the objects of the pure understanding, and is supposed to demonstrate and make comprehensible the objective validity of its concepts *a priori* [...]. The other side deals with the pure understanding itself, concerning its possibility and the powers of cognition on which it itself rests.

While the objective deduction (OD) attempts to establish the objective validity of the categories of understanding – the sum of which constitutes the logical function of thought – by determining them as *a priori* conditions of possibility for objective representation, the subjective part (SD) presents a transcendental description of the *objectifying function*, so to speak.⁵²⁵ As it is particularly the SD that has been interpreted as addressing the problem of Hume's labyrinth by presenting an analysis of what the mind must be like, or, more particularly, of the conditions of synthesis and unity in experience, it forms a most interesting point of departure for the present investigation.⁵²⁶ The distinction and interrelation of the arguments presented in the OD and the SD respectively, was captured by Kant as follows:⁵²⁷

[I]t is already a sufficient deduction of them [i.e. the categories] and justification of **their objective validity** if we can prove that by means of them alone an object can be thought. But since in such a thought there is more at work than the single faculty of thinking, namely the understanding, and the understanding itself, as a faculty of cognition that is to be related to objects, also requires an elucidation of the possibility of this relation, we must first assess [...] **the transcendental constitution of the subjective sources** that comprise the *a priori* foundations for the possibility of experience.

While the deduction in general is a notoriously hard nut to crack, in the past decades quite some grappling has been going on regarding the status and systematic significance of the SD in particular. In itself, this is hardly surprising, given Kant's rather hesitant presentation of it in the A-edition of the *Critique*.⁵²⁸

[T]he chief question always remains: "What and how much can understanding and reason cognize free of all experience?" and not: "How is the faculty of thinking itself possible?" Since the latter question is something like the search for the cause of a given effect, and is therefore something like a hypothesis (although, as I will elsewhere take the opportunity to show, this is not in fact how matters stand),

⁵²⁵ CPR [A70/B95]; Brook (1994), p. 25, 120; also see Kitcher (1990).

⁵²⁶ I am referring mainly to the work of Patricia Kitcher (1982, 1990, 2011). Also see Patten (1976), Powell (1990), Brook (1994), Allison (1995).

⁵²⁷ CPR [A97] [boldface added].

⁵²⁸ CPR [Axvii].

it appears as if I am taking the liberty in this case of expressing an opinion, and that the reader might therefore be free to hold another opinion.

Furthermore, given the aim of the SD to determine the necessary characteristics of the cognitive faculty in general, its vocabulary and tone, especially in the A-edition, is rather psychological, and hence, the exposition occupies a bit of an odd position amidst the formal expositions of the *Critique*. Kant's extensive revision of the *Deduction* in the B-edition of the *Critique*, in which the SD is formulated in much more abstract terms, reveals the Prussian philosopher's struggle with his transcendental approach to the *Gemüth*. Due to these peculiar characteristics, the SD has been received by many with scepticism, or dismissed as an objectionable and altogether peripheral part of the *Critique*.⁵²⁹ However, there is some agreement that its core ideas are retained in the B-edition, though in more abstract terms, which suggests that Kant never changed his mind with respect to its importance for the critical analysis of experience.⁵³⁰ Furthermore, it should be noted that OD and SD are not presented in neatly separated sections, but that the former is largely embedded in the latter. Consequently, there is quite some disagreement over the limits and scope of the SD. From this it follows that the question of whether or not Kant abandoned his SD in the second edition of the *CPR*, depends on how one defines and limits its arguments.⁵³¹

In what follows, these exegetical difficulties will be set aside, and we will focus on Kant's doctrines of *synthesis* and *apperception*, as presented in both the A- and B-edition of the *CPR*, which were read by quite a few authors as being at least partly motivated by the problems that surfaced in Hume's Appendix.

4.4 Kant's Doctrines of Synthesis and Apperception

Through a series of articles and books, Kitcher presents a convincing body of evidence in favor of the hypotheses (i) that Kant was well aware of Hume's problems with *Personal Identity* when he wrote the *CPR*, and that hence, (ii) some passages in the latter work –

⁵²⁹ Kitcher (1990); Allison (1995). Both Kitcher and Allison point to Strawson as one of the philosophers who dismissed the subjective deduction, and Allison credits Kitcher with bringing it back under scholarly attention, although he does not fully agree with her naturalized reading of it (see section 4.5.1).

⁵³⁰ See Powell (1990), Brook (1994), Allison (1995) and Kitcher (2011).

⁵³¹ As Kitcher (1990, p. 121) notes, some authors read the doctrine of apperception as a part of the objective deduction. I agree with her, however, that this issue is in itself not important as "everything in the subjective deduction is part of the objective deduction."

most importantly the deduction – were written explicitly as an attempt to overcome Hume's labyrinth.⁵³² Even if one is not convinced by the textual and historical evidence Kitcher presents in support of her reading of the *Deduction* as a deliberate and explicit answer to Hume's problem with personal identity, it remains that one can find in Kant's *CPR*, whether intentionally or not, an adequate response to the problems raised in the previous chapter, and this in itself suffices for the systematic purposes of our investigation.

First of all, Kant's *Critique* allows for a diagnosis of Hume's problem with personal identity in terms of a conflation of the (natural concept of the) empirical 'self' and (the normative concept of) epistemic subjectivity. For Kant, Hume's bundle theory was not so much *wrong*, as it was trivial with regard to the question of the foundation of experience. It is true, Kant claims, that what we find through 'inner sense' (or 'empirical apperception') is "forever variable; it can provide no standing or abiding self in this stream of inner appearances."⁵³³ Neither a connecting principle, nor a unity can be found *in* experience, which reveals only a flux, a chaos and bundles. But then again, he adds:⁵³⁴

That which should necessarily be represented as numerically identical cannot be thought of as such through empirical data. There must be a condition that precedes all experience and makes the latter itself possible [...].

In other words: the principles of determinability – i.e. Hume's connecting principle, and the principle for the unity of experience – and the subject they inhere, cannot be derived from, but precede empirical determination, and, consequently, Hume's empirical strategy cannot but produce tautological answers:⁵³⁵

[S]ince **I want to observe the mere I** through the change in all my representations, I have [...] no correlate other than myself for my comparisons [...] I can therefore give nothing but tautological answers to all questions, because I substitute my concept and its unity for the properties pertaining to my self as an object, and thus **merely presuppose what one demanded to know**.

⁵³² This hypothesis contradicts Kemp Smith's (1923/1962), who maintained that Kant had no knowledge of Hume's problem. While there is no way of determining whether Kant has actually read Hume on this topic, Kitcher points to the mediating influence of for example Beattie and Tetens, two figures whom Kant did read, and who addressed the problem extensively in their works. For an overview of Kitcher's arguments in this respect, see Kitcher (1982), p. 43-44; (1990), p. 98-100; (2011), p. 31-32.

⁵³³ *CPR* [A107].

⁵³⁴ *CPR* [A107]. Also see Kitcher (1990), p. 102.

⁵³⁵ *CPR* [A366] [boldface added].

In these passages of the *CPR*, Kant's diagnosis of Hume's problem aligns with the problems that were pinpointed in section 3.3.1.1, where the methodological inadequacy of the latter's quasi-observational strategy was discussed.

More interestingly, however, Kant's system provides an adequate answer to Hume's vanishing hopes with regard to "the principle of connexion which binds them [i.e. particular perceptions] together, and [...] the principles that unite our successive perceptions in our thought and consciousness."⁵³⁶ More particularly, Kant's doctrines of synthesis and apperception, as they are formulated in the context of his broader endeavor to investigate *what the mind must be like* to represent objects, can be read as a response to Hume's problems with the connecting principle and the unity of experience respectively.

4.4.1 The Necessary Connection: Synthesis

In the A-deduction, Kant presents a quite extensive argument against the sufficiency of associative mechanisms (or the reproductive power of imagination, as he calls it) to account for the unitary and determinate experience of an object. "Combination (*conjunctio*)," Kant echoes Hume's *Appendix*, "can never come to us through the senses," nor is it "given through objects."⁵³⁷ However, empirical synthesis would simply be impossible if one does not presuppose that a sensible manifold is always *already* subjected to a rule:⁵³⁸

The law of reproduction [...] presupposes that [...] in the manifold of their representations an accompaniment or succession takes place according to certain rules. [...] [I]f one and the same word were attributed now to this thing, now to that, or if one and the same thing were sometimes called this, sometimes that, without the governance of a certain rule to which the appearances are already subjected [...] then no empirical synthesis [...] could take place.

Whether deliberately or not, this passage starts where Hume left off, i.e. in the observation that connection is not a principle of experience, but that any experience would be impossible without an operative connecting principle.⁵³⁹ The problem is that

⁵³⁶ Hume (1969 [1839/40]), p. 677-678.

⁵³⁷ *CPR* [B129-130].

⁵³⁸ *CPR* [A101].

⁵³⁹ *CPR* [A100]: "This law of reproductions [...] presupposes that the appearances themselves are actually subject to [...] a rule, and that in the manifold of their representations an accompaniment or succession takes place according to certain rules; for without that our empirical imagination [...] would [...] remain hidden in the interior of the mind, like a dead and to us unknown faculty. If cinnabar were now red, now black, now

association in itself is too 'promiscuous', as Kitcher expresses it: in the end, everything can be associated with everything, and hence, there would be no experience possible, if the constructive process was not *a priori* guided by a rule that imposes its necessity on associative combination.⁵⁴⁰ In accordance with the transcendental mode of inquiry, Kant transforms the question of association into that of the *associability* of sensible manifolds, and, more particularly, he argues that the rule of association is given *a priori* through an act of pure spontaneity:⁵⁴¹

[A]ll combination [...] is an action of the understanding, which we would designate with the general title synthesis in order [...] to draw attention to the fact that we can represent nothing as combined in the object without having previously combined it ourselves, and that among all representations combination is the only one that is not given through objects but can be executed only by the subject itself, since it is an act of self-activity.

In laying out the basic principles of his transcendental account of experience, Kant thus addresses Hume's necessary connecting principle by pointing out that the subject is not merely reactive, but active, and necessarily so, with respect to the incoming sensible material. One could argue that the theoretical significance of this intellectual leap from associative construction to the question of associability, is in the way in which it deepens the understanding of the dynamics of objectification. More particularly, Kant takes the object or phenomenon out of the realm of blind mental mechanics, and places it in an interpretive framework concerned with the conditions and principles underlying the subjective constitution of meaning. Furthermore, the transcendental categories provide the *a priori* rules of synthesis, and therefore, they derive their objectivity from their universal necessity with regard to the possibility of experience and knowledge.

As will be discussed extensively in section 4.6.2, Helmholtz famously adopted one of Kant's *a priori* rules of synthesis, namely the principle of causality. Kant mainly elaborated his views on this principle in the *Second Analogy of Experience*, that sets out to demonstrate that all experience of succession is *a priori* conditioned by the principle that "[a]ll alterations occur in accordance with the law of the connection of cause and

light, how heavy, [...] then my empirical imagination would never even get the opportunity to think of heavy cinnabar on the occasion of the representation of the colour red; [...] if one and the same thing were sometimes called this, sometimes that, without the governance of a certain rule to which the appearances are already subjected in themselves, then no empirical synthesis of reproduction could take place."

⁵⁴⁰ See for example Kitcher (1990), p. 79: "Kant concludes that we need a rule that connects a cognitive state with another cognitive state in preference to others [A121]. Spatiotemporal contiguity is too promiscuous." Also see Brook (1994), p. 122.

⁵⁴¹ CPR [A130].

effect.”⁵⁴² More particularly, Kant claims that all that is *given* through sensibility is ordered according to the rule that anything that happens presupposes “that something else precedes it,” and that⁵⁴³

[i]t is only because we subject the sequence of the appearance and thus all alteration to the law of causality that experience itself, i.e. empirical cognition [...] is possible; consequently they themselves, as objects of experience, are possible only in accordance with this law.

In other words, the causal law in Kant’s work is invoked to explain the way in which successive perceptions are transformed into the perception of succession.⁵⁴⁴ As such, the causal law is a necessary condition for experience, since it founds the determinability of a sequence of disparate elements given through the faculty of sensibility, and thus guarantees the *discursive* unity of a sensory manifold in time.⁵⁴⁵

At this point, it is important to note that the discursive imposition of *a priori* principles on sensible givens is to be distinguished from the intuitive unity of sensible material, which does not pertain to the order of sensible events, but to the way in which they are determinable as temporal and spatial magnitudes in intuition.⁵⁴⁶ To be more precise, in accordance to his ‘two stems of knowledge,’ Kant distinguishes between *mathematical* principles of experience on the one hand, and *dynamical principles* on the other:⁵⁴⁷

In the application of the pure concepts of understanding to possible experience the use of their synthesis is either mathematical or dynamical: for it pertains partly merely to the intuition, partly to the existence of an appearance in general. The *a priori* conditions of intuition, [...] are necessary throughout in regard to a possible experience, while those of the existence of the objects [...] are in

⁵⁴² CPR [A189/B232-A211/B256]. Kant’s second analogy, which is commonly read as an explicit attempt to refute Hume’s scepticism with regard to the causal law, has been discussed extensively in the secondary literature, and there is considerable disagreement over the exact nature of the argument Kant presents in it. For our purposes, however, it suffices to understand Kant’s general take on the apriority of the causal law. For more recent discussions on this matter, see for example Allison (2004) and Guyer (2008).

⁵⁴³ CPR [A195/B240]; [A189/B234].

⁵⁴⁴ Allison (2004), p. 250.

⁵⁴⁵ Kant further describes the causal law as a rule of time determination, as it formally determines the temporal sequence of experience by positing a regular order between precedents and consequents, and a rule by which the former produces the latter. Hence Kant’s view on causality is intrinsically related to his doctrine of time as presented in the *Transcendental Aesthetics* (CPR [A30-A49/B48-B73]).

⁵⁴⁶ CPR [A160/B199]. Kant’s pure apperception is extensively discussed in the secondary literature. In this section we present a general outline of the main argument. Our discussion of the possible problems arising from Kant’s principle is reserved for the next section.

⁵⁴⁷ CPR [A160-162/B199-201].

themselves only contingent. Hence the principles of the mathematical use will be unconditionally necessary, i.e. apodictic, while the principles of the dynamical use [...] carry with them the character of an *a priori* necessity, but only under the conditions of empirical thinking in an experience, thus only mediately and indirectly [...]. While the former are capable of an intuitive certainty, the latter are capable only of a discursive certainty.

According to this distinction, the principle of causality – as a discursive, dynamical principle of experience – is subjected to the conditions of the materiality of experience, i.e. it presupposes that an appearance is given, and supplies the discursive conditions under which alone the appearance can be *thought*, and hence objectified, in accordance to definite rules.⁵⁴⁸

4.4.2 The Unity of Experience: Kant's *I think*

Kant's doctrine of synthesis, however, is only part of the way out of Hume's labyrinth, as it addresses the problem of the necessary connecting principle, but not that of the unity of experience:⁵⁴⁹

[I]n addition to the concept of the manifold and its synthesis, the concept of combination also carries with it the concept of the unity of the manifold. Combination is the representation of the synthetic unity of the manifold. **The representation of this unity cannot, therefore, arise from the combination; rather by being added to the representation of the manifold, it first makes the concept of combination possible.** [...] [W]e must [...] seek this unity someplace higher, namely in that which itself contains the ground of the unity of different concepts in judgments, and hence of the possibility of the understanding.

In other words, the possibility of experience not only depends on spontaneous acts of synthesis, but more importantly, the synthetic manifold should be integrated in one consciousness. To account for the unity of experience, Kant introduces the concept of pure apperception, or the transcendental principle of the *I think*:⁵⁵⁰

⁵⁴⁸ For Kant's definition of appearance, see CPR [A20/B34] [boldface in original text]: "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**."

⁵⁴⁹ CPR [B131] [boldface added].

⁵⁵⁰ CPR [B132] [boldface in original text].

The **I think** must **be able** to accompany all my representations; for otherwise something would be represented in me that could not be thought at all, which is as much as to say that the representation would either be impossible or else at least would be nothing for me. [...] Thus all manifold of intuition has a necessary relation to the **I think** in the same subject in which this manifold is to be encountered. But this representation is an act of **spontaneity**, i.e., cannot be regarded as belonging to sensibility. I call it **pure apperception**, in order to distinguish it from the empirical one [...].

In this passage it is clear that Kant grounds the possibility of synthesis in yet another, more fundamental transcendental principle, i.e. the *I think*, that denotes the necessary self-referential structure of the synthetic act. Hence, pure apperception is determined as the most fundamental act of spontaneity, the highest principle of all cognition, and the transcendental precondition for the (use of) the categories.⁵⁵¹ The *I think* guarantees that a manifold “is united in one consciousness,” and it is only by virtue of this self-referential structure that an object can “become an object for me,” i.e. it is the “condition under which alone I can ascribe them to the identical self as **my** representations, and thus can grasp them together.”⁵⁵² To illustrate his doctrine, Kant gives the following example:⁵⁵³

[I]n order to cognize something in space, e.g., a line, I must draw it, and thus synthetically bring about a determinate combination of the given manifold, so that the unity of this action is at the same time the unity of consciousness (in the concept of a line), and thereby is an object (a determinate space) first cognized.

This example clearly illustrates that Kant’s doctrine of apperception is articulated not merely as an abstract principle, but also in reference to the unity of *acts* of synthesis. Furthermore, the principle relates the determinability of objects in space, to the unity of the act of determination. More particularly, the unity of consciousness is put forward as a condition of possibility for the *Vor-stellung* of the object, i.e. for its determination in terms of a definite *out there*, that occupies a determinate position in space.

Again, this is a point in Kant’s theorizing on which we should elaborate a little more, mainly because Kant’s transcendental doctrine of space was famously criticized by Helmholtz (see section 4.6.2). Therefore, it is necessary to briefly restate Kant’s

⁵⁵¹ CPR [B135-B139], also see [A401]: “Apperception is itself the ground of the possibility of the categories, which for their part represents nothing other than the synthesis of the manifold of intuition, insofar as that manifold has unity in apperception. Self-consciousness in general is therefore the representation of that which is the condition of all unity, and yet is itself unconditioned.”

⁵⁵² CPR [B137]. Also see [B132], [B428-B432].

⁵⁵³ CPR [B137].

argument for the transcendental nature of space, as outlined in his *Transcendental Aesthetics* [A22-A30/B37-B45].

In his first *Critique*, Kant famously argues that “[s]pace represents no property at all of any things in themselves,” [A26/B42] but rather is “nothing other than merely the form of all appearances of the outer sense, i.e., the subjective condition of sensibility, under which alone outer intuition is possible.” Furthermore, he identifies this *a priori* spatial form with the Euclidean axioms, which are hence determined as *a priori* synthetic principles: although geometric propositions are synthetic (i.e. cannot be derived analytically from a general concept) they cannot be derived from, but should be presupposed as necessary conditions of experience and, by extension, of geometric knowledge. To arrive at this point, Kant’s transcendental argument takes the following steps:⁵⁵⁴

Space is **not an empirical concept** [...] for in order for certain sensations to be related to something outside me [...] thus in order for me to represent them as outside one another [...] the representation of space must already be their ground [...]. [A23/B38]

Space is a **necessary representation, a priori**, which is the ground of all outer intuitions. [...] It is [...] to be regarded as the condition of the possibility of appearances, not as a determination dependent on them, and is an *a priori* representation that necessarily grounds outer appearances. [A24/B38]

The **apodictic certainty of all geometrical principles** and the possibility of their *a priori* construction are grounded in this *a priori* necessity. For if this representation of space were a concept acquired *a posteriori*, [...] the first principles of mathematical determination would [...] have all the contingency of perception. [A24/B39]

Space is [...] a **pure intuition**. [...] [A]ll geometrical principles, e.g., that in a triangle two sides together are always greater than the third, are never derived from general concepts of the line and triangle, but rather are derived from intuition and indeed derived *a priori* with apodictic certainty. [A25/B39]

To summarize: as space cannot be derived from, but is presupposed by, experience, it is not empirical, but *a priori*. Given that Euclidean space has a constitutive role for experience, it is necessary, and, in accordance with the transcendental rationale, this

⁵⁵⁴ [boldface added].

necessity in turn finds its apodictic certainty.⁵⁵⁵ In conclusion, the Euclidean axioms belong to the pure form of intuition, i.e. express synthetic principles *a priori*. From these arguments, Kant arrives at his view of geometry as “a science that determines the properties of space synthetically, and yet *a priori*,” and restates this transcendental view as follows.⁵⁵⁶

[T]he representation of space [...] must originally be intuition; for from a mere concept no propositions can be drawn that go beyond the concept, which, however, happens in geometry [...] but this intuition must be encountered in us *a priori*, i.e., prior to all perception 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, e.g. space has only three dimensions; but such propositions cannot be empirical, or judgments of experience, nor inferred from them [...]. Now how can an outer intuition inhabit the mind that precedes the objects themselves [...]? Obviously not otherwise than insofar as it has its seat merely in the subject, as its formal constitution for being affected by objects and thereby acquiring immediate representation, i.e. intuition, of them, thus only as the form of outer sense in general.

This passage captures the main spirit of Kant’s Copernican revolution, i.e. his indication of the subject as the ‘seat’ of knowledge and experience, and the fusion of the question of objectivity with the interrogation of the necessary features of the objectifying function. Hence, it is a suitable way of concluding this rather lengthy section, in which Kant’s interrogation of *what the mind must be like* in general, and his doctrines of synthesis and apperception in particular, have been put forward as apt responses to the problems with the strict empiricist framework of the object, as sketched in the previous chapter.

However, one final aspect of Kant’s theorizing should be addressed, which was soon perceived to be the aporetic corner of the transcendental project: the elusive subject = x of his *Critique* and the grammatical subject of the *I think*. In accordance with the general

⁵⁵⁵ For the typically transcendental structure of the argument, i.e. the way in which it finds the certainty of geometrical principles in their necessity for experience, also see *CPR* [B65/A48]: “You must [...] give your object *a priori* in intuition, and ground your synthetic proposition on this. If there did not lie in you a faculty for intuiting *a priori*; if this subjective condition regarding form were not at the same time the universal *a priori* condition under which alone the object [...] is itself possible [...] then how could you say that what necessarily lies in your subjective conditions for constructing a triangle must also necessarily pertain to the triangle in itself?”

⁵⁵⁶ *CPR* [B41].

strategy of this dissertation, this is the point where we find the motive for moving beyond Kant in the next chapter. More importantly, however, in order to get a firm grasp of Helmholtz's idiosyncratic appropriation of central aspects of Kant's critical analysis, one should not only consider the former's explicitly psychological perspective, but also his criticism and dissatisfaction with certain elements of Kant's philosophy. To be more specific, Helmholtz's reading of Kant is quite heavily tainted by his objections to Kant's dualism with regard to the stems of knowledge on the one hand, and, on the other, a psychological concern that pertains exactly to the further articulation of the self-reflexive structure of the epistemic subject, as captured in Kant's *I think*. As will become clear in the remainder of this chapter and the next, both problems, i.e. dualism and self-reflexivity, are interrelated in Helmholtz's psychology of the object. Therefore, a closer look at Kant's *I think* is in order, although a full grasp of why this is so – and more importantly: why this is so in light of Helmholtz's theorizing – will only prove possible towards the end of this chapter, after we have considered the full extent of Helmholtz's relation to Kant.

4.5 Kant and the *I think*: Discussion

In hindsight, Kant's philosophical system proved to be a fertile ground for quite dramatic problematizations of the subject. Post-Kantian philosophy shows a virtual obsession with *unity*, in at least two different ways, i.e. the unity of the critical system on the one hand, and the unity of the subject on the other.⁵⁵⁷ To be more precise, many were concerned with the seemingly insurmountable duality between sensibility and understanding, or the passive and active side of the *Gemüth*, that was the starting point of Kant's analysis, and with the way in which Kant's elusive subject = x relates to these

⁵⁵⁷ See Stevenson (2012), p. 23: "There are perhaps many ways to tell the story of how the Idealists 'moved on' from Kant, and many ways in which it has in fact been told. [...] The first, perhaps most obvious, characteristic theme is the focus on systematicity and in particular the need to ground the systematic whole of philosophy on a single principle. [...] The other theme is the focus on the 'I' itself, that is, the need to develop a theory of subjectivity, and in particular of the unity of subjectivity, as the most important of philosophy's genuine tasks." Stevenson (2012) offers an analysis of Fichte's and Heidegger's philosophies in light of this search for unity. Zöller (1999) offers a similar analysis of the way in which post-Kantian philosophy developed from the problem of unity in Kant, and focuses on Schopenhauer's metaphysical system. In the same vein, Frank (2004) presents an analysis of the problem of subjectivity from Kant to Kierkegaard, that starts from the same hypothesis. In our investigation, the focus will be on Fichte's further expansion and radicalization of Kant's pure apperception, as presented mainly in the next chapter.

‘two stems’. Therefore, we will now present a further analysis of Kant’s *I think*, based on the *CPR*, and subsequently, three ways in which it has been scrutinized up until this day.

In the *Paralogisms of Pure Reason*, Kant further elucidates his view on the subject = x around which his whole *Critique* circles, but which is not an object of possible knowledge itself.⁵⁵⁸ In that section, Kant among other things distinguishes the *I think*, further defined as the concept that “serves only to introduce all thinking as belonging to consciousness”, from the idea of a substantial self on the one hand, and of the empirical self on the other.⁵⁵⁹ The former idea, Kant specifies, “has its origin in a mere misunderstanding”:⁵⁶⁰

The unity of consciousness, which grounds the categories, is here taken for an intuition of the subject as an object, and the category of substance is applied to it. But this unity is only the unity of thinking, through which no object is given; and thus the category of substance, which always presupposes a given intuition, cannot be applied to it, and hence this subject cannot be cognized at all.

In other words, the (subreptive) idea of a substantial self is the product of a *category mistake* [Kategorienfehler], i.e. the application of the category of substance on a concept that merely denotes the transcendental unity of consciousness. The ‘I’ of the *I think*, Kant adds, differs fundamentally from the objectified self that is expressed in the idea of a substantial ego, as the former expresses “the thinking being in general”, while the latter refers to the “consciousness of a separate possible existence of my thinking self.”⁵⁶¹ In conclusion, the idea of substantial ego is produced by a flawed objectification of what is nothing but a formal principle of experience: it is the confusion between the unity of perception and the perception of unity, which Kant calls the *subreption of hypostatized consciousness* (*apperceptionis substantiate*). The self-in-itself, or the *noumenal* subject, remains unknowable.

Furthermore, the I of the *I think* is distinguished from the empirical subject or phenomenal self, i.e. the self that determines itself consciously as the owner and author of representations. This conscious determination, Kant explains, does not produce, but requires the transcendental act of pure apperception. In other words, empirical self-consciousness is an act of empirical determination that presupposes the transcendental *I think* as a condition of determinability. This difference between transcendental and empirical self-consciousness is aptly described by Stevenson:⁵⁶²

⁵⁵⁸ *CPR* [B404]; [A341/B399–A405/B432].

⁵⁵⁹ *CPR* [A341/B399].

⁵⁶⁰ *CPR* [B422].

⁵⁶¹ *CPR* [B402, B426].

⁵⁶² Stevenson (2012), p. 33.

Actually being aware of a representation as mind, i.e. representing to myself 'I think x', [...] requires some specific determination of the manifold of intuition within inner sense (x). Original apperception is itself the ground of empirical self-consciousness, that is, awareness of the contents of one's thoughts. It produces the simple representation 'I think', which itself is merely an expression of the original act of synthesis.

In short, when attempting to distinguish the *I think* from the phenomenal self, we are once again confronted with the circularity that is produced by the attempt to determine principles of determinability through quasi-observational strategies (see chapter 3, section 3.3.1.1).

So much for the negative descriptions of Kant's subject = x: the grammatical subject of the *I think* is neither a substantial self, nor does it express the empirical determination of self in self-consciousness. With these negative qualifications, the possible ways of circumscribing the *I think* are at once exhausted, as it would be a *contradictio in terminis* to infuse this x with positive meaning. Nonetheless, the limits of Kant's philosophy form the point of departure for Fichte, for example, who's philosophical project unfolds from the question "Which 'I' is being spoken of here? [Von welchem Ich ist hier die Rede]?"⁵⁶³ From a Kantian perspective, this question is in itself transgressive, as he defines the *I think* as both an empty concept, and a blind intuition:⁵⁶⁴

[W]e can place nothing but the simple and in content [...] wholly **empty representation** I, of which one cannot even say that it is a concept, [...] Through this I, or He, or It (the thing), which thinks, nothing further is represented than a **transcendental subject of thoughts = x**, which is recognized only through the thoughts that are its predicates, and about which, in abstraction, we can never have even the least concept; [...] we cannot separate ourselves from this inconvenience, because the consciousness in itself is not even **a representation**.

[...]

The 'I think' is [...] **an empirical proposition**, and contains within itself the proposition 'I exist'. It expresses **an indeterminate empirical intuition**, i.e. a perception (hence it proves that sensation, which consequently belongs to sensibility, grounds this existential proposition), but it precedes the experience

⁵⁶³ Fichte (1982 [1794, 1797/98]), p. 48.

⁵⁶⁴ CPR [B404], [B422] [boldface added]. Also see CPR [A51/B75]: "Thoughts without content are empty, intuitions without concepts are blind. It is thus just as necessary to make the mind's concepts sensible (i.e. to add an object to them in intuition) as it is to make its intuitions understandable (i.e. to bring them under concepts)."

that is to determine the object of perception [...]. [...] [W]ithout any empirical representation, which provides the material for thinking, the act *I think* would not take place, and the empirical is only the condition of application, or use, of the **pure intellectual faculty**.

In the end, Kant's subject = x is both a definite nothing, and an indefinite something.⁵⁶⁵ As such, Kant's pure apperception has a status that is fundamentally different from anything else in the *Critique*. It transcends both stems of knowledge and is the empty and blind abyss from which the transcendental analysis arises, and yet, it is just that: subject = x.

But then again, is there a problem with the *I think*, or with the 'I' of the *I think*, as many post-Kantians have believed? Although Kant takes up the matter of his highest principle of cognition over and over again until he dies, he never seemed to consider it a problem himself, and one even gets the impression that he did everything he could to safeguard its unruly, elusive nature. In his *Opus Postumum*, for example, he revisits his highest postulate, but his additional remarks can hardly be called elucidating:⁵⁶⁶

The first act of the faculty of representation [...] is the representation of oneself (*apperceptio*) through which the subject makes itself into an object (*apperceptio simplex*); and its representation is intuition (*intuitus*), not yet concept (*conceptus*): that is, representation of an individual [...], not yet that which is common to many [...], that is, a generally valid representation [...] The first act of knowledge is the verb: I am, - self-consciousness, for I [as] subject, am an object to myself.

In this passage, the *I think* is described not just as an indeterminate act, but an *a priori*, reflexive act of self-determination, through which the subject becomes object to itself, without becoming object altogether. At this point in the discussion, Kant's *I think* has apparently become an inextricable maze of negative and positive qualifications. Inextricable in principle, so it seems, although the *I think* is just as "systematically elusive" as it is "ineliminable."⁵⁶⁷

As already suggested, Kant's abysmal subject was not only productive from a systematic point of view – i.e. it founded the entire transcendental analysis of experience – but likewise from a historical perspective. That is to say, Kant's abysmal subject produced an astonishing amount of literature on the nature of the subject of experience, and how it is to be conceptualized, beginning with the post-Kantians, and

⁵⁶⁵ One might say that the *I think*, in terms of Kant's *Table of Nothing* [A290/B347], is both an *ens rationis* ("a concept without an object") and *ens imaginarium* (a "form of intuition, without substance [...] not an object, but the merely formal condition of one").

⁵⁶⁶ Kant (1993 [1804]), p. 178-179.

⁵⁶⁷ Allison (1995), p. 351.

spreading out right up to the present. Furthermore, there is an endless variety of different ways in which the *I think* was conceived of as a problem. In order to grasp the extent of the post-Kantian problematization of pure apperception, three different forms will be presented below: two recent ones, i.e. Patricia Kitcher's and Manfred Frank's, and finally the Fichtean one. All these authors share the claim that there was indeed a problem with Kant's foundational postulate, although they disagree on what this problem amounted to. Although we are especially interested in Fichte's diagnosis, it is useful to also review Kitcher's and Frank's work, if only to get a taste of the ways in which Kant's theory of subjectivity was eventually received by many as 'Kant's problem'.

4.5.1 Patricia Kitcher's Construction of 'Kant's Problem'

Kitcher's analysis of the *I think* is presented mainly in the introduction to her 1990 *Kant's Transcendental Psychology*, and her interpretation actually founds her naturalized reading of Kant's *Critique*.⁵⁶⁸ The problematization of Kant's principle of apperception starts with an attempt to determine the nature of the grammatical subject of the *I think*, through an analysis of how it relates to Kant's foundational distinction between *noumena* and *phenomena*, and the derivative ideas of the noumenal and the phenomenal self, the 'two official selves of the *Critique*', according to the author.⁵⁶⁹ Kitcher's analysis can be schematized as follows.⁵⁷⁰

- (1) In Kant's philosophy, the self is either phenomenal or noumenal.
 - (1a) This distinction is both exclusive and exhaustive.
 - (1b) Hence, the I of the *I think* should be either phenomenal or noumenal.
- (2) If the I is noumenal, no positive statements can be made about it.
- (3) If the I is phenomenal, it is causally determined.
- (4) Kant makes (abstract and general) positive statements about the I (e.g. that it is a self-relating activity), so it cannot be noumenal.
- (5) Although Kant does not want to affirm the phenomenality of the I – in light of the disastrous consequences this would have for his moral theory, founded in the autonomous I – he cannot avoid it, given his own exclusive and exhaustive scheme.

⁵⁶⁸ Kitcher (1990, 2011); Allison (1995).

⁵⁶⁹ Kitcher (1990), p. 21.

⁵⁷⁰ This reconstruction is based on Kitcher's argument as presented in (1990), p. 22.

(6) Hence, the I of the *I think* necessarily denotes the phenomenal self, and from this, its causal determination inevitably follows.

The basic idea is thus that Kant’s “doctrinal dualism” causes quite serious problems when it comes to determining the status of the I in the *I think*.⁵⁷¹ To quote Kitcher:⁵⁷²

[T]he *Critique* maintains that there are two selves [...]. From one perspective, it is understood as ‘phenomenal’ or ‘empirical’, ‘passive’ subject to natural laws, and hence unfit to be the object of moral criticism. According to the other, the self is ‘noumenal’, completely unknown and unknowable [...] [I]t is not clear how the I of apperception can be fitted into this scheme. [...] Given the impossibility of noumenal knowledge, the doctrine of apperception must present a phenomenal [...] aspect of the self.

So, according to Kitcher, Kant “refuses to acknowledge” the phenomenality of the *I think*, given that this would make his subject = x a part of nature, subjected to the stern law of natural causality, which would in turn affect the autonomous, free subject of Kant’s second *Critique*. Yet, Kitcher proceeds, Kant cannot consistently endorse a noumenal conception of the self as the basis of his critical analysis of experience. Hence, she concludes, that “we might as well admit” to the fact that the I in Kant’s highest postulate is phenomenal.⁵⁷³

Several objections can be made against this reconstruction of Kant’s problem. As Allison noted, the argument is already flawed from the start, as the phenomenal-noumenal distinction applies only to (possible) *objects* of cognition, and hence, not to

⁵⁷¹ Also see Zöller (1999), p. 21: “The starting point for the post-Kantian discussion in general and post-Kantian theories of the self in particular is Kant’s ‘critical distinction’ between things as they appear [...] and things as they are in themselves [...]. Kant’s doctrinal dualism poses some difficulties when it comes to determining the status of the self. The role of the self as the bearer and contributor of the *a priori* forms of cognition seems to elude the distinction between the self as empirically known appearance and the self as unknowable thing in itself.”

⁵⁷² Kitcher (1990), p. 139.

⁵⁷³ Kitcher (1990), p. 140. Also see Kant (2002 [1788]), p. 60-61: “This Analytic establishes that pure reason can be practical, i.e., that it can on its own, independently of everything empirical, determine the will; specifically, it establishes this through a fact wherein pure reason does indeed prove itself in us practically, viz., the autonomy in the principle of morality by which pure reason determines the will to the deed. At the same time the Analytic shows that this fact is inseparably linked with the consciousness of the freedom of the will [...]. Through this consciousness of its freedom the will of a rational being that, as belonging to the world of sense, cognizes itself as necessarily subject to the laws of causality like other efficient causes is yet in the practical [sphere] at the same time conscious [...] of its existence [as] determinable in an intelligible order of things. [...] For [...] freedom, if it is attributed to us, transfers us into an intelligible order of things.” Also see CPR [A532/B560], [A533/B561], [A557/B585].

the *I think*, that is “not a thing, but an idea.”⁵⁷⁴ Both the *noumenal* and the *phenomenal* self, however, have an objectal structure in cognition: while the former denotes the transgressive concept of the self as substance, the latter refers to the subject as it objectifies itself in experience as the subject of experience. As already explained in the previous section, the I as act, should therefore be distinguished from both the noumenal and the phenomenal self, and hence, it cannot be analyzed according to Kant's dualist scheme. More importantly, however, Kitcher's naturalized conception of the I as a phenomenal self turns Kant's formal principle into an element of empirical cognition and through this operation, the whole transcendental project loses its foundational base.⁵⁷⁵

[T]he phenomenal self cannot serve as the subject of transcendental psychology. Since it is itself an object in the phenomenal world (the object of inner sense), the possibility of cognizing or in any way representing to oneself the phenomenal self can be explained only in terms of transcendental grounds, and therefore, with reference to the transcendental subject.

Again, we are led to consider the methodological problems related to the empirical determination of Kant's pure apperception. Kitcher's naturalized conception of the I ultimately leads up to her definition of the mind as a system of “contentually interconnected systems of cognitive states,” which seems eerily similar to Hume's bundles.⁵⁷⁶ In conclusion, Kitcher's attempt to overcome the elusiveness of the *I think* through its naturalization, seems to lead us right back into Hume's labyrinth, or at best, to a “more sophisticated version” of Hume's bundles, as Marshall concludes.⁵⁷⁷

4.5.2 Manfred Frank's Construction of 'Kant's problem'

For Manfred Frank's approach to 'Kant's Problem' we can turn especially to his analyses of modern theories of self-consciousness, as presented for example in his articles from 2004 and 2007. In contrast to Kitcher, Frank honors the foundational status of Kant's pure apperception as a *formal principle* and its logical primacy over phenomenal self-consciousness. According to Frank, however, Kant's reluctance to clearly articulate the

⁵⁷⁴ Allison (1995); also see Marshall (2010).

⁵⁷⁵ Allison (1995), p. 350.

⁵⁷⁶ Kitcher (1990), p. 122. This criticism was raised by Allison (1995), and more recently by Marshall (2010).

⁵⁷⁷ Marshall (2010), p. 211.

structure of the I in the *I think* derives from a methodological deadlock.⁵⁷⁸ To be more precise, Frank argues that Kant was caught up in what he calls the ‘representation-model of the self’, or the reflection theory of subjectivity.⁵⁷⁹ While the Prussian philosopher maintained that the *I think* should be able to accompany all of the subject’s representations – or is the necessary correlate of all cognitive acts – his attempt to articulate his foundational principle failed, Frank argues, because he mistakenly applied his mode of thinking about objects to the *subject* of his principle. Therefore, he interprets Kant’s claim that “I cannot cognize as an object [...] what I must presuppose in order to cognize an object”, as a testimony of the philosopher’s “peculiar aporia” with regard his own foundational principle.⁵⁸⁰ According to Frank, Kant found himself faced with the following problem:⁵⁸¹

A manifold of intuition determined by the categories is [...] what Kant terms cognition. It is obvious, however, that the principle in whose name this determination takes place, [...] cannot become an object of knowledge, because it is not sensible.[...] [T]he pure I cannot be known as an objective existent. As soon as this conclusion is accepted, however, it is clear that it has disastrous consequences for the self-evidence of the highest point of theoretical philosophy.

In conclusion, Frank discusses Kant’s *embarrassment* about finding himself caught up in the circle of the representing and the represented I, and, more importantly, about the observation that the principle that founds his entire system is in itself an ‘unfounded presupposition’.⁵⁸² While Kitcher maintained that Kant could not affirm the *phenomenal* nature of the I in light of his moral theory, Frank’s analysis amounts to the conclusion that Kant could not articulate the necessary *Ideality* of the I, due to his self-imposed limitation of cognition as a synthesis of sensible material and understanding. As such,

⁵⁷⁸ See for example Frank (2004), p. 67: “Kant was so absorbed in the task of deducing the thought of objectivity from the identity of consciousness that he paid hardly any attention to the internal structure of his deductive principle [...]. He must deny the self the status of a possible object of cognition, because the term cognition [...] is reserved by him to those operations in which the intellectual enters into synthesis with the sensible. At the same time he indicates the circle which arises from the fact that, in order to grasp itself reflexively, the Ego must always already have been acquainted with its own objectivity prior to any self-conception. [...] [T]he error must be with the explanatory model that is employed to make it comprehensible.”

⁵⁷⁹ Frank (2004), p. 67; Frank (2007), p. 158. Also see Henrich (1982 [1967]).

⁵⁸⁰ CPR [A402]; also see Frank (2004), p. 60; Frank (2007), p. 153.

⁵⁸¹ Frank (2004), p. 57. Also see Henrich (1982 [1967]).

⁵⁸² Frank (2004), p. 57, 63.

one could say that Frank pushes Kant's pure apperception towards the exact opposite of Kitcher's phenomenal 'solution', i.e. towards a radical idealization.⁵⁸³

While Frank's overall work provides an intriguing narrative about the problem of subjectivity in the history of modern philosophy – with Hume, Kant and Fichte as important protagonists – his construction of Kant's problem seems to be quite problematic. First of all, Kant's 'confession' in [A402] was not a confession at all, but rather an explanation of why the I is *elusive in its very nature*. From all that has been said hitherto, it is clear enough that Kant (i) explicitly recognized the philosophical problems related to the attempts to objectify the subject = x, and (ii) that this was the very reason for his *circling around* it. Furthermore, as Frank himself suggests, the I in itself was never a problem for Kant, who was merely interested in its formal function within the context of his critical epistemology.⁵⁸⁴

However, both Frank and Kitcher connect Kant's problem with the I to the dualist structure of his doctrine. As will be discussed in what follows, a clear articulation of the way in which the problem of the unity of the subject relates to the problem of duality, is to be found in Johann Gottlieb Fichte's work. Although a full discussion of Fichte's response to Kant's pure apperception is reserved for the next chapter, the broad outlines will already be sketched below.

4.5.3 Johann Gottlieb Fichte's Construction of 'Kant's Problem'

As already noted, Fichte's analysis of experience, as presented for example in his 1797/98 *Versuch einer neuen Darstellung der Wissenschaftlehre*, takes the question "Which I is being spoken of here?" as a point of departure.⁵⁸⁵ In contrast to the interpretations sketched above, Fichte's concern with the *I think* is not so much motivated by an attempt to solve Kant's alleged problem. Rather, he aspires to complete Kant's system by "demonstrating what Kant had postulated," i.e. the self-reflexive structure of the I as the highest principle of critical philosophy, and the ultimate basis of all knowledge and

⁵⁸³ Frank (2007) explicitly argues that 'Kant's problem' is only solved by the 'idealistic intuition' of, for example, Schellings 'original' (urständig) subjectivity or Schleiermacher's 'non-objectal' (ungegenständlich) subjectivity, which grasp the subject in its 'pure subjectivity'. Frank (2004, 2007) credits Fichte with overcoming the problems with the *I think* through his pure Ego. What this means exactly will be discussed extensively in the next chapter.

⁵⁸⁴ Frank (2004).

⁵⁸⁵ Fichte (1982 [1794, 1797/98]), p. 48. Everything said in these few paragraphs will be further elaborated in the next chapter.

experience.⁵⁸⁶ Hence, the further elaboration of the nature and structure of the I that is the subject of the *I think*, was, in Fichte's mind, a logical completion of Kant's project. His analysis starts by pointing out the relation of the *I think* to the dualism in Kant's system, which Sturma expresses as follows:⁵⁸⁷

The Kantian doctrine of transcendental idealism, [...] is specifically characterized by a fundamental dualist structure with regard to the distinction between the 'given' and the 'constituted'. It was precisely this dualism that represented the *skandalon* of philosophy for the post-Kantian idealists, and that had at all costs to be overcome.

What is most intriguing about Fichte's philosophical system, however, is the way in which he transforms the self-reflexive structure of the I into an operator of difference, not only within the critical system (i.e. as the basis of Kant's two stems of knowledge), but likewise, at the level of experience (i.e. as the act of spontaneity that founds differential consciousness of an I and a Not-I). From this, Pinkard concludes that:⁵⁸⁸

The core insight at the root of Fichte's attempt to complete the Kantian system [...] had to do with what he saw as the basic dichotomy at the root of the Kantian system. [...] Fichte concluded, that dichotomy itself – that core distinction between subjects and objects – was itself subjectively established; it was a normative distinction that subjects themselves institute.

As such, Fichte's problematization of pure apperception amounts to an expansion of Kant's spontaneity from acts of synthesis to acts of differentiation. That is to say, Fichte assigns an active role to the subject not only in the conceptual determination of sensible givens, but more fundamentally, in producing the difference between intuition and thought, matter and form, passivity and activity in experience. Given this shift in perspective, Fichte's philosophical project has been aptly described as a *metacritique*, i.e. as a *critique* of Kant's critical analysis, which takes the latter's postulated duality as the first subject of critical inquiry.⁵⁸⁹

The details of Fichte's account and the way in which it provides a relevant background for understanding Helmholtz's psychology of the object, will be discussed extensively in the next chapter. For now, it suffices to understand that Fichte not only established the self-reflexive structure of the I as a unitary foundation of critical philosophy, he furthermore thematized the critical function of this I in terms of subject-

⁵⁸⁶ Fichte (1982 [1794, 1797/98]), p. 51; Wood (2000), p. 98.

⁵⁸⁷ Sturma (2000), p. 216.

⁵⁸⁸ Pinkard (2002), p. 108-109.

⁵⁸⁹ See for example Zöllner (2000).

object differentiation in experience. In this sense, one might say that Fichte, who is commonly perceived as a philosopher obsessed with unity, was just as much, and more interestingly so, a philosopher of *difference*. More particularly, from a Fichtean perspective, the problem of Kant's pure apperception lies not primarily in its lack of articulation, but in the way in which the postulate of the *I think* at once postulates a duality between this *I think* and that which it is not, i.e. the object. From this standpoint, the lack of articulation of the *I think* in the *CPR* is only a problem to the extent that it bars the way for a critical investigation of the origin of duality and differentiability.

With this analysis, we have thus arrived at the aporetic corner of Kant's philosophy, i.e. its lack of critical investigation of difference, and pinpointed the motive for the transition to a next level of analysis in the following chapter. In turning to Helmholtz's appropriation of Kant in the next section, however, it will soon become clear that this appropriation is already conditioned by a criticism of Kant's duality, which is why we need to discuss this before we can move on to the second (Kantian) level of analysis in Helmholtz's psychology of the object.

4.6 Helmholtz's Kant: Towards a Critical Analysis of Experience

In the early 1850s, when Helmholtz was appointed a professorship in anatomy and physiology in Bonn, and had started his research on the nature of human perception, he wrote to his father:⁵⁹⁰

It seems to me a favorable moment for the voices of the old school of Kant and [...] Fichte to obtain a hearing once more. [...] Philosophy finds its great significance among the sciences as the theory of the source and functions of knowledge, in the sense in which Kant, and, so far as I have understood him, the elder Fichte, took it.

Later in his career, Helmholtz used every opportunity to stress the way in which his research confirmed or continued aspects of Kant's philosophy.⁵⁹¹ For the scientist, Kant's first *Critique* presented an epochal shift in thinking about human experience, and he credited the philosopher for demonstrating the constitutive role of "pure thinking *a priori*," and for pointing out that all of our perceptions are "conditioned by the peculiar

⁵⁹⁰ Hermann von Helmholtz, as quoted in Koenigsberger (1902/03), p. 284 [my translation].

⁵⁹¹ See for example Helmholtz (1995 [1868, 1878b, 1891, 1892]).

ability of our mind [eigenthümlichen Fähigkeiten unseres Geistes].”⁵⁹² Furthermore, he claimed that “according to this [i.e. Kant’s] view perception is recognized as an effect [Wirkung] produced on our sensitive faculty [...] this effect [...] being just as dependent on that which causes the effect [dem Wirkenden] as on the nature of that on which the effect is produced [dessen, auf welches gewirkt wird].”⁵⁹³ Helmholtz was a self-proclaimed Kantian in conceiving of the study of human perception as a borderland [Grenzgebiet] between the exact sciences and philosophy, in which the latter “considers [...] that which belongs to the mind’s own activity. [...] [T]hat which is definition, designation, form of representation and hypothesis.”⁵⁹⁴ In the next two chapters, we will therefore discuss the levels of analysis in Helmholtz’s psychology that engage most generally with the critical question of what *the mind or subject must be like* in order to produce experience. These levels logically precede his account of perception as empirical construction, in considering the necessary *a priori* elements of experience.

In analyzing the way in which Helmholtz’s psychology relates to Kant’s critical analysis of experience, we engage in one of the most debated characteristics of the former’s theorizing. During Helmholtz’s lifetime and soon after, a number of monographs appeared that were entitled “Helmholtz und Kant.”⁵⁹⁵ The debate on the peculiar entanglement of empiricism and (transcendental) idealism, however, continues up to this day.⁵⁹⁶ In addition to the discussions that arose as a consequence of Helmholtz’s physiological interpretation of Kant’s forms of intuition (see chapter 2), two other topics have dominated philosophical debates on Helmholtz’s Kantianism, namely (i) the former’s refutation of the transcendental doctrine of space, and (ii) his appropriation of Kant’s apriorism with regard to the causal law.⁵⁹⁷ Remarkably, there seems to be little or no consensus on either one of these topics. While Helmholtz’s refutation of Kant’s doctrine of space was initially received as providing a final blow to the Kantian idea of the synthetic *a priori*, some have argued that it did not affect the Kantian system in any way, while still others maintained that Helmholtz’s empirical theory of spatial determination amounts to a displacement or transformation, rather

⁵⁹² Helmholtz (1867 [1856/1866], III), p. 456 [my translation].

⁵⁹³ *Ibid.*

⁵⁹⁴ Helmholtz (1995 [1878b]), p. 344.

⁵⁹⁵ See for example Krause (1878), Schwertschlagler (1883), and Goldschmidt (1898).

⁵⁹⁶ For some recent examples, see DiSalle (2006), Hyder (2006), Lenoir (2006), Schiemann (2009), Meulders (2010), and Neuber (2012).

⁵⁹⁷ For Helmholtz’s criticism of Kant’s theory of space, see especially Helmholtz (1883 [1866, 1878a], 1995 [1870, 1878b], 1896); for his expositions concerning the apriority of the causal law, see among others Helmholtz (1896 [1855], 1995 [1868, 1878b, 1892]).

than an elimination, of the *a priori*.⁵⁹⁸ With regard to Helmholtz's appeal to the causal law, the specter of different interpretations is equally broad: Helmholtz's use of the principle of sufficient ground has been interpreted as (more or less) Kantian, or as being on a par with Hume and/or Mill, while still others have interpreted it as explicitly Fichtean in character.⁵⁹⁹

In contrast to the bulk of secondary literature that focuses on Helmholtz's epistemological position and his philosophy of science, we will now discuss these matters specifically from the perspective of Helmholtz's psychological concerns. More particularly, in order to grasp the systematic place of Helmholtz' relation to Kant in the former's psychological theory, we will analyze Helmholtz's adoption (and transformation) of Kant's category of causality and his revision of the transcendental doctrine of space against the background of the former's attempts to account for the psychogenesis of the object in perception.

Within the context of Helmholtz's semiotic understanding of the subject-object relation, the general question of *what the mind must be like* takes the form of *what it is to understand*, i.e. which subjective functions underlie the possibility of the constitution and symbolic engagement with the external world? Perceptual understanding, in Helmholtz's theorizing, comes down to correctly deciphering the sign-language "by which external objects discourse to us."⁶⁰⁰ In his empirical theory of perception as unconscious inference, Helmholtz accounts for the surface structure of this deciphering process by pointing out the mediating role of previous experience and voluntary movement. However, it is especially Helmholtz's quite abstract interrogation of the *normative* question regarding the conditions of *understandability* or *comprehensibility* that has raised particular attention since the nineteenth century.⁶⁰¹ As already explained in the first chapter (see section 1.2), Helmholtz emphasized the causal structure of understanding, both on the level of discursivity (the scientific investigation of natural phenomena) and perception (the understanding of sign-sensations). In other words, to understand, according to Helmholtz, is to relegate the variety of natural phenomena, or

⁵⁹⁸ While Krause (1878) believed that Helmholtz's refutation could lead to a complete dissolution of Kant's system, Land (1877) maintained that the refutation itself was based on a misunderstanding of Kant's doctrine. More recently, Friedman (2009, p. 256) argued that Helmholtz's theory of space had "deep roots in Kant's original conception," which aligns with Neuber (2012). In this context, also see Hatfield (1990), Hyder (1999), Neuber (2012).

⁵⁹⁹ Riehl (1904), Helmholtz (1977 [1878b]) and Schiemann (2009), for example, argue that Helmholtz's mature view of causality is on a par with empiricists such as Mill and/or Hume. Alternatively, Heimann (1974), Fullinwider (1990) and Hatfield (1990) maintain that Helmholtz's view of causality remained Kantian in spirit, while Turner (1977) suggests that Helmholtz aligned more with Fichte on this point.

⁶⁰⁰ Helmholtz (1995 [1869]), p. 222.

⁶⁰¹ See for example Krüger (1994).

the flux of sensible material, to the lawlike action of a hypothesized *real* cause, or *Ursache*.⁶⁰²

If to conceive [Begreifen] means to form concepts [Begriffe], [...] it follows that [...] the concept must try to summarize a changing series of phenomena [...] one which remains the same in all its stages. The wise man, as Schiller expressed it:

Seeks the trusting law in Chance's horrifying wonders,
Seeks the resting pole in Phenomena's flight

In what follows, we will outline Helmholtz's views on perceptual comprehensibility and the way in which these relate to Kant's transcendental analysis. After considering Helmholtz's appropriation and adaptation of Kant's causal law, some interpretative difficulties will be sketched. In conclusion, it is argued that in order to grasp some of the idiosyncrasies regarding Helmholtz's appeal to Kant in this respect, one should take into account the former's criticism of Kant's epistemological dualism in general, and the concept of intuition [Anschauung] in particular. After this, I will turn to the investigation of Helmholtz's revision of Kant's transcendental conception of space, and the way in which it can likewise be related to his discomfort with the Kantian notion of intuition.

4.6.1 Perceptual Comprehensibility: Founding the Signaling Function of the Sign-Sensation

As was explained in the previous chapter, the concept of the object in Helmholtz's theorizing is generated through the recognition of a lawlike covariation of circles of sensations and bodily movement: to conceive an object *x* as being there, is to conceive of all the possible sensations it might produce under various circumstances. However, Helmholtz denies that the flux of sensations is in and by itself capable of producing these conditional certainties. Given the fundamentally underdetermined nature of sensations with respect to their origin, association alone cannot explain how we first escape the world of our nervous systems:⁶⁰³

[I]s that which I have called thinking [...] earlier, [...] nothing but a mechanical [...] association of ideas? **I ask you, to take one last step with me, a step, that will take us back [...] to Kant** [...] If there is to arise a connection between the idea [Vorstellung] of an object [...] and sensations, we must already have the idea of

⁶⁰² Helmholtz (1995 [1878b]), p. 360-361.

⁶⁰³ Helmholtz (1896 [1855]), p. 115 [my translation, boldface added].

such a determined object. [...] [W]e never directly perceive external objects, but only the effects of these objects on the nervous system, and that has been the case since the very first moments of our lives. **What first enables us to pass from the world of nervous sensations into the world of actuality** [Welt der Wirklichkeit]?

Here again, we could appeal to the so called *promiscuity* of association to clarify the problem at stake (see section 4.4.2). In itself, everything can be associated with everything, and Helmholtzian sensations (successive states of excitation) are in themselves too meager, and the succession of sensations is too contingent, to produce the necessary associative combination, i.e. the associative process does not contain the rule for the associability of sensations.⁶⁰⁴ Hence, the flux of sensory modifications is inapt to produce anything that would come close to a lawlike connection, or the idea of the object as a necessary and sufficient cause. In Helmholtz's theorizing, the historical discussion regarding the necessary connecting principle thus reappears as the question concerning the signaling function of the sign, i.e. the problem of accounting for the foundation of the ability to establish lawlike connections between sensation-signs and object-meanings. This is the point where Helmholtz's inquiry shifts from an interrogation of perceptual comprehension to the question of perceptual comprehensibility.

To address this problem, Helmholtz famously argues that the perceptual process is dependent *a priori* on the imposition of a causal structure on every possible experience. Consequently, he determines the law of causation as a necessary subjective function, that founds the possibility of perceptual reference and provides a motive for objectification:⁶⁰⁵

We have to presuppose the presence of external objects as the cause of our nervous excitation, because there can be no effect without a cause. How do we

⁶⁰⁴ To understand the problem at stake, one might point to the difference between Helmholtz's sign-sensations and Reid's conception of sensations as 'natural signs' (see chapter 3): for Helmholtz, sensations are not intrinsically related to objects, as in Reid's 'natural magic', but are "signs which we have learned to decipher [...] a language [...] that we can only learn by experience and practice" (Helmholtz, 1995 [1869], p. 222). Given this empirical understanding of the perceptual process, Helmholtz comes to face the problems outlined in the previous chapter, i.e. the problem that the succession of sensations is in itself entirely contingent, and hence, cannot produce a necessary connection, nor the unitary experience of an object.

⁶⁰⁵ Helmholtz (1896 [1855]), p. 116 [my translation]. Also see Heyfelder (1897). It is interesting to note that in 1869 (p. 115) the neo-Kantian Otto Liebmann put forward a similar account of the theoretical relation between perceptual objectification and causal understanding. In order to explain the capacity for objectification, the latter stated, we should presume that "Human understanding is always, independently of the empirical circumstances, convinced, that it is possible to formulate a satisfying answer to the question 'Where is this coming from?' [...] Therefore, the category of causality is the *a priori* form of understanding. And it is [...] the condition of possibility of every possible perception, and therefore, of experience."

know that there can be no effect without a cause? Is it a law of experience [Erfahrungssatz]? According to some, it is. But [...] we use the law to arrive [...] at the insight that there are objects [...] in the first place [...]. Can we get it from the internal experience of our self-consciousness? No; since we conceive of self-conscious acts of volition and thought as free; i.e. we deny that they are the necessary effects of sufficient causes. In this way, the inquiry into the nature of sense perception leads us to the insight that Kant had already revealed: that the law [...] is a law of thought, given prior to experience.

In other words, a sign is only a sign, according to Helmholtz, for a being that “is driven to seek the lawful,” as Hatfield put it.⁶⁰⁶ “Just as it is the particular activity of our eyes to experience light [...],” the former writes in 1867, “it is the peculiar activity of our understanding [Verstandes] [...] to search for causes, and it [understanding] cannot but understand the world as a causal connection.”⁶⁰⁷ The transition from the contingent and underdetermined world of nervous excitations to the notion of a law, is mediated by this ‘regulative principle of our thinking’.⁶⁰⁸

If we assume [...] that we will be able to establish a final unchangeable something as the cause of observed changes, then we call the regulative principle of our thinking, that which impels us, the causal law. [...] [I]t expresses trust in the complete conceivability of the world. Conceiving [...] is the method by means of which our thinking masters the world, orders the facts, predetermines the future. [...] The causal law is really an *a priori* given, transcendental law [...] not even the first steps of experience are possible without [...] the causal law.

Subsequently, Helmholtz opposes this *a priori* conception to J.S. Mill’s regularity view, i.e. the claim that “the law of cause and effect, is itself an instance of induction.”⁶⁰⁹ For Helmholtz, it is only “by virtue of” the law of causality as a form of thought [Denkform] that we progress from effects to causes, and hence, he argues that “this law of thought precedes experience. We cannot [...] experience [...] objects, if the law of causality were not already operative in us.” Consequently, the law “cannot be derived [...] from experience” and cannot be demonstrated empirically.⁶¹⁰ In the end, Helmholtz’s

⁶⁰⁶ Hatfield (1993), p. 557.

⁶⁰⁷ Helmholtz (1867 [1856/1866], III), p. 455 [my translation].

⁶⁰⁸ Helmholtz (1995 [1878b]), p. 363.

⁶⁰⁹ Mill (1882 [1843]), p. 401. See for example Helmholtz (1867 [1856/1866], III), p. 453: “The law of causation, [...] has to be considered [...] as being a law of our thinking which is prior to all experience. [...] The law of causation was supposed to be a law of nature arrived at by induction. Recently it has been again interpreted in that way by J.S. Mill. [...] As opposed to that view, I shall merely say, [...] that there is a good reason to think that the empirical proof of the law is extremely doubtful.”

⁶¹⁰ Helmholtz (1867 [1856/1866], III), p. 453 [my translation].

statement (see chapter 3) that “we can never emerge from the world of our sensations to [...] an external world, except by inferring from the changing sensation that external objects are the cause of this change,” is only intelligible against the background of his insistence on the *a priori* causal structure of understanding, by virtue of which contingent sensations are transformed into constant signs.

4.6.2 Helmholtz's Kantianism: Critical Reflections

Although we have now pinpointed the systematic significance of Helmholtz's appropriation of Kant's causal law within his own theorizing – i.e. as the foundation of the signalling function of sign-sensations – we cannot sidestep the notorious interpretative difficulties surrounding Helmholtz's self-professed. In what follows, three of the most debated perceived difficulties with Helmholtz's view on causality will therefore be discussed:

- (i) The evolution in Helmholtz's conception of the causal law;
- (ii) Helmholtz's psychologistic understanding of the concept of necessity;
- (iii) The different reading of Helmholtz's use of the law that emerges when it is viewed in light of his criticism of Kant's *Anschauung*.

The first two problems emerge mainly from the fact that Helmholtz adopts elements from what is essentially an epistemological theory into a psychological account. The third one, however, complicates Helmholtz's view of causality, and its relation to Kant, in quite a different way. More particularly, upon closer analysis, it is clear that Helmholtz appropriates the law in an interpretative framework of experience that differs radically from Kant's, in that it overthrows the latter's distinction between the passive (receptive) and the active (spontaneous) faculties of the *Gemüth*.

4.6.2.1 The Evolution in Helmholtz's Understanding of the Causal Law

One of the difficulties with interpreting Helmholtz's conception of the causal law, is the way in which his position evolved in the course of his career. There is considerable disagreement on both the exact nature of this evolution, and Helmholtz's mature stance on causality.

To gain insight in the evolution of Helmholtz's conception of the causal law, his 1847 paper, and especially the 1881 appendix added to it, offers an interesting point of departure. In the initial introduction to *On the Conservation of Force*, Helmholtz had stated that the theoretical part of physics that “seeks to determine [...] the unknown causes of events,” is justified in this endeavor “by the fundamental law that every cause has an effect,” a law that is hence determined as the necessary presupposition of the

comprehensibility [Begrreiflichkeit] of nature.⁶¹¹ In an 1881 appendix, however, Helmholtz seemingly changed his mind about the Kantian character of his initial 1847 introduction:⁶¹²

The philosophical discussion in the Introduction was more strongly influenced by Kant's epistemological perspective, as I would now consider to be correct. It is only later that it became clear to me [...] that the principle of causality is [...] nothing but the presupposition of lawfulness in all natural phenomena. [...] [T]he law posits conditions for every effect.

Helmholtz's *Appendix*, however, poses at least two problems, namely (1) that his 'revision' can hardly be called un-Kantian, as it reaffirms the status of the law as a principle of comprehensibility, and (2) that even after 1881, Helmholtz restates that the causal law is "an *a priori*, transcendental law" in the context of his psychological theory.⁶¹³

The first problem automatically raises the question as to what position Helmholtz had initially ascribed to Kant, given his own conviction that the appendix signifies a clear retreat. A first viable hypothesis in this respect can be derived from Helmholtz's discussions with Land on the metaphysical status of the *Real* as *Ur-sache* (see chapter 1). To be more specific, one might suggest that Helmholtz's 1847 appeal to the law was meant to justify positive statements made about the cause of natural phenomena, and hence indicated (and justified) a realist understanding of the epistemic status of the notion of cause.⁶¹⁴ In that case, Helmholtz's 1881 withdrawal would have been intrinsically related to his mature emphasis on the hypothetical character of the metaphysical concept of *Reality*.⁶¹⁵ If this was indeed the motive behind Helmholtz's appendix, however, this would entail that his initial understanding of Kantian causality as that which takes us immediately to things in themselves, was hopelessly flawed, as it would imply an illegitimate use of a category beyond the limits of possible knowledge. Furthermore, Helmholtz's 1881 correction, if understood in terms of a retreat from causal realism, would actually mean more of a rapprochement to than a departure from

⁶¹¹ Helmholtz (1889 [1847]), p. 4.

⁶¹² Helmholtz (1889 [1847]), p. 53.

⁶¹³ Helmholtz (1995 [1878b]; 1896). Also see Riehl (1904).

⁶¹⁴ See Hatfield (1990) and Fullinwider (1990).

⁶¹⁵ Helmholtz (1883 [1878a]), p. 656. Also see Helmholtz (1878b, 1896).

Kant, who stressed that the causal law is a discursive principle of understanding, and, as such, not a feature of things-in-themselves.⁶¹⁶

There is, however, a second hypothesis that could provide more insight into Helmholtz's motive for reconsidering his initial stance. In comparing the 1847 and 1881 statements, one notices that Helmholtz's retreat mainly affects the justificatory power of the causal law, while its subjective necessity is retained. In 1881, the law has become 'a mere presupposition'. Hence, one could hypothesize that the most significant 'evolution' in Helmholtz's thought on causality was related to the way in which he dissociates its justificatory power from its subjective necessity, or its epistemological and its psychological necessity.⁶¹⁷ This would likewise imply a misunderstanding of, or a disregard for, central elements of Kant's project, but in quite a different way. More particularly, this dissociation suggests a lack of sensitivity for the inextricable relation between subjective necessity and apodictic certainty in the *Critique*, and, more particularly, for the spirit of Kant's transcendental deduction.⁶¹⁸ Although the dissolution of objectivity and subjective necessity significantly changes the meaning of the *a priori*, it seems indeed that the mature Helmholtz endorsed both (i) the epistemological contingency, and (ii) psychological necessity of the causal law. That is to say, although Helmholtz maintained that the causal structure of understanding is an *a priori* condition of knowledge and experience, he also emphasized its hypothetical

⁶¹⁶ Fullinwider (1990), among others, argued that Helmholtz's causal law takes us immediately to the thing-in-itself, and therefore relates the discussion of Helmholtz's conception of causality to the problem of affection in Kant's first *Critique*. This problem – prototypically raised as an objection to the soundness of Kant's transcendental analysis of experience in Schulze (1911) – concerns the explanation of sensible affection in terms of the causal efficacy of the unknown thing-in-itself. As the latter would imply an illegitimate application of the category of causality beyond the realm of possible experience, this allegation would gravely affect the Kantian notion of the thing-in-itself as a boundary concept (*CPR* [B311]). However, as Jacobi (1799), and, more recently, Hanna (2006) argue, one could ascribe this objection to a confusion between thinking and knowing, or between a subject's double nature as a sensible and a rational being. While the thing-in-itself can be legitimately *thought of* as the cause of sensible affection, this does not imply that it is thereby *known*. As rational beings, subjects produce the idea of a transcendent object as the cause of sensations, while this concept remains nothing but an empty *ens rationis* (a thing of reason), without an actual referent (*CPR* [A290/B347]). In the same sense, Helmholtzian sensation can be said to indicate the Real, or provide the occasion for the generation of the empty concept of Reality as cause, while this does not necessarily imply a robust metaphysical realism. For recent discussions of the problem of affection in Kant, see for example Westphal (1997), Hanna (2006), Sandkaulen (2007), Schulting & Verburgt (2010). As will be explained in the next chapter, the problem of affection was an important motive for Fichte's post-Kantian attempt to expand and complete the Kantian analysis of experience.

⁶¹⁷ Hatfield (1990), Fullinwider (1990), Schmitz (1996), Patton (2009).

⁶¹⁸ See Hatfield (1990), p. 216.

nature, especially during the last decades of life. In a posthumously published note, Helmholtz captures his thoughts on the matter as follows:⁶¹⁹

The Law of Causation [...] is a mere hypothesis, and not otherwise demonstrable. [...] The sole test of any hypothesis is, try if it be so, and you will find out [...]. In comparison with other hypotheses [...] the law of causality is exceptional in the following ways: (1) all others presuppose it; (2) it gives us our sole possibility of knowing something we have not yet observed; (3) it is the necessary foundation of [...] action; [...] Hence we are induced by the strongest motives to desire its validity. It is the groundwork of all our thoughts and acts.

From this, Schiemann concludes that Helmholtz's conception of causality in his later years "no longer deviated much from Mill's standpoint on the issue."⁶²⁰ In the same vein, Riehl (1904) and Schlick (1921) had argued earlier that Helmholtz "took the path of David Hume" with regard to causality, since its validity in Helmholtz's theorizing never rises above its status as a mere hypothesis.⁶²¹ In the second, revised version of the *Treatise*, however, Helmholtz explicitly reiterates his Kantian stance on the matter, and furthermore, maintains that the principle of sufficient reason itself is not, and cannot be, a product of experience, but is rather an indispensable condition of possibility for the latter. Hence, it seems more reasonable to assume that while Helmholtz's epistemological stance with regard to the contingent status of the law is close to Hume's and Mill's, he never abandoned his ideas concerning its *a priori* necessity for experience and knowledge.⁶²² With regard to the necessary role of the *a priori* causal structure of understanding in experience, Helmholtz thus sided with Kant, although he drastically reinterpreted the *a priori* to fit his psychological theory, as will be explained in the next sections. For one thing, the concept of necessity in Helmholtz's theorizing "ceases to be the factor that defines objectivity," as Fullinwider notes.⁶²³ Evidence for this hypothesis can easily be found. Take for example the following passage, that claims that the law of

⁶¹⁹ Hermann von Helmholtz as quoted in Koenigsberger (1906 [1902/03]), p. 142 [my translation].

⁶²⁰ Schiemann (2009), p. 240. Also see DiSalle (1993), p. 505.

⁶²¹ Schlick in Helmholtz (1977 [1878b]), p. 163; also see Riehl (1904).

⁶²² As Hatfield (1990, p. 217) notes, however, Helmholtz differed from Hume in emphasizing the practical justification of the law for scientific reasoning. To be more specific, although Helmholtz may have stressed the contingent character of causality, his position never amounted to a straightforward denial of any possible rational justification of the law. Nevertheless, Helmholtz's pragmatic theory of objectivity still differs significantly from Kant's transcendental deduction of the apodictic certainty of causal inference, and as such, both authors hold a fundamentally different view with regard to what constitutes objectivity.

⁶²³ Fullinwider (1990), p. 48.

causality is *a priori*, transcendental, and yet contingent from an epistemological viewpoint.⁶²⁴

The causal law is really an *a priori* given, a transcendental law. It is not possible to prove it by experience because, as we have seen, not even the first steps of experience are possible without [...] the causal law; and from the completed experience, when **it too taught that everything observed so far has proceeded in a law-like manner – which we are assuredly far from being justified in claiming – would always only be able to follow by an inductive conclusion,** i.e. under the assumption of the causal law, that now the causal law would also be valid in the future. Only one piece of advice is valid here: trust and act! [...] This would be the response that we would have to offer to the question: what is truth in our representation.

In this passage, Helmholtz at once formulates his pragmatic view on the epistemological status of causality, and his *a priori* perspective on its psychological necessity. In conclusion, it seems that Helmholtz's much debated 'evolution' was explicitly epistemological in nature, and did not affect his views on the *a priori* necessity of causality for perception. In the context of his psychological theory, Helmholtz maintained the aprioricity of the law, and the way in which this normative principle founds his empirical theory.

As already suggested, however, Helmholtz's integration of epistemological concepts in a psychological framework did have drastic implications for the meaning of the *a priori*, and, more precisely, for the understanding of 'subjective necessity'. As such, the consideration of the evolution of the causal law in Helmholtz's conception automatically leads us to another, related, interpretative problem, namely Helmholtz's psychologized understanding of Kant's *a priori*.

4.6.2.2 Helmholtz's Psychological Interpretation of 'Subjective Necessity'

While in the previous section we have pointed out that Helmholtz dissociated the ideas of subjective necessity and epistemological certainty, and as such, reduced the meaning of the *a priori* to the former, we now have to consider the scientist's psychological understanding of necessity. While Helmholtz's merit as a psychologist lies in his engagement with the critical question of *what the mind must be like* to experience objects, his recuperation of the *a priori* in a psychological framework, was, according to some, detrimental for the spirit of Kant's *Critique*. Consequently, Helmholtz was both

⁶²⁴ Helmholtz (1995 [1878b]), p. 363 [boldface added]. Also see Helmholtz (1896), p. 594.

applauded as a *philosophical psychologist* (e.g. by the early neo-Kantian Otto Liebmann) and heavily criticized as a *psychological philosopher*.⁶²⁵

Although Helmholtz frequently stated that the causal law is *logical* in character, his choice of terminology indicates a quite explicit psychological understanding of causality.⁶²⁶ In 1867, for example, he describes it as an “urge [Trieb] of our thought [Verstandes] to subject all perceptions to its control,” and later specifies this ‘Trieb’ in nativist terms, i.e. as “the inborn effect of our organization.”⁶²⁷ Elsewhere, Helmholtz argues that the law expresses a “trust in the complete comprehensibility of the world,” a “want to understand everything,” and the “method by virtue of which our thought masters the world.”⁶²⁸ This qualification of the causal structure of understanding in terms of a *Trieb*, a *trust*, and a *wish*, contrasts sharply with the abstract and formal character of Kant’s transcendental exposition, and in that sense, Disalle’s objection that Helmholtz “reinterpreted the Kantian *a priori* as something that Kant never intended it to be: a species of psychological adaptation,” does not seem to be far off the mark.⁶²⁹ This resonates with Schmitz’s understanding of Helmholtz’s law of causality as that which first makes sensory modifications comprehensible: “the human mind does not understand change, without questioning the laws of changes.”⁶³⁰ The causal law in Helmholtz’s theorizing expresses a psychological disposition, a subjective urge to interrogate and objectify sensory modifications. Helmholtz furthermore determines this urge to be a defining feature of a being that aims at obtaining mastery over its surroundings. As such, his psychological articulation of the causal law evokes the image of a goal-driven, action-oriented psychological subject, that is nothing like the abstract subject = x of the *Critiques*.

⁶²⁵ The early neo-Kantian Otto Liebmann (1869), for example, credited Helmholtz for his return to the critical perspective in psychology, and more specifically, for his insistence on the necessary logical surplus (or the ‘intellectual factor’) that is involved in object constitution. Also see Lange (1881), p. 202-203: “The physiology of the sense-organs is developed or corrected Kantianism, and Kant’s system may, as it were, be regarded as a programme for modern discoveries in this field. One of the most successful inquirers, Helmholtz, has employed the views of Kant as a heuristic principle, and yet in so doing has only followed consciously and consistently the same path by which others too have succeeded in making the mechanism of sensation more intelligible.” A little further on (p. 219), Lange credits Helmholtz for having demonstrated that “the sense-world is a product of our organisation.” For Cohen (1871), by contrast, Helmholtz’s appropriation of the *a priori* entailed such a serious infringement on Kant’s deductive proof, that it was one of his motives to call for a return to the historical Kant.

⁶²⁶ For Helmholtz’s statements on the logical nature of the causal law, see for example Helmholtz (1867 [1856/1866]), p. 453.

⁶²⁷ Helmholtz (1867 [1856/1866], III), p. 455; Helmholtz (1894), p. 96.

⁶²⁸ Helmholtz (1896), p. 594 [my translation]; Helmholtz (1867 [1856/1866], III), p. 454.

⁶²⁹ Disalle (1993), p. 505.

⁶³⁰ Schmitz (1996), p. 79.

Helmholtz was soon criticized for the epistemological implications of this psychologized understanding of subjective necessity. More particularly, the two transformations the *a priori* underwent within Helmholtz's psychological theory – i.e. its dissociation from the question of objective validity, and its articulation in terms of a psychological *Trieb* – have led to a revival of the problem that Kant had purportedly solved in his first *Critique*, i.e. the epistemological problem of validity [Geltungsproblem]. The Marburg school of neo-Kantianism – including Hermann Cohen and Paul Natorp, among others – was especially concerned about the way in which Helmholtz's psychological appropriation of the *a priori* ultimately undid Kant's most fundamental epistemological gesture, i.e. the coupling of subjective necessity and epistemological certainty.⁶³¹ Consequently, in the wake of Helmholtz's theorizing, a vast amount of literature arose on the importance of carefully distinguishing between the psychological and the philosophical analysis of experience, in order to prevent a complete deflation of the meaning of the *a priori*. Natorp, for example, contended that in psychological research “the objectivity of knowledge is entirely neutralized in subjectivity. As appearance of an objectifying thought is itself a mere content of consciousness, the objective foundation of truth seems in fact to be subjective.” Further, he writes: “if one understands [...] by consciousness, a consciousness in the psychological sense, then the law that founds the unity of the object is inevitably a law of subjectivity, a psychological law, and the so-called objective foundation of the laws of truth are [...] subjective and psychological.”⁶³² In short, appropriations of Kantian concepts within a psychological framework, such as Helmholtz's adoption of the causal law, were heavily criticized, as the contingency of the psychological subject was apparently carried over to the epistemic status of transcendental laws, thus undoing Kant's most basic epistemological gesture.⁶³³

From a historical viewpoint, Helmholtz's analysis of objectification in terms of the necessary structure of the objectifying function, thus led to his being denounced for psychologizing epistemology. From the perspective of the psychological problem of the object, however, Helmholtz's inquiry into the necessary structure of understanding

⁶³¹ See for example Natorp (1888), Cohen (1871) and Liebert (1920). For a recent discussion of Helmholtz's role in the revival of the problem of validity, see Patton (2009).

⁶³² Natorp (1888), p. 107-108 [my translation]; in this context also see Liebert (1920).

⁶³³ Also see Russell (1897), p. 2: “To Kant, who was nothing of a psychologist, *a priori* and subjective were almost interchangeable terms; in modern usage there is, on the whole, a tendency to confine the word subjective to psychology, leaving *a priori* to do duty for epistemology. If we accept this differentiation, we may set up, corresponding to the problems of these two sciences, the following provisional definitions: *a priori* applies to any piece of knowledge which, though perhaps elicited by experience, is logically presupposed in experience; subjective applies to any mental state whose immediate cause lies, not in the external world, but within the limits of the subject.”

marks a definite move beyond the naturalistic framework. This move derives its systematic significance from the way in which it allows the scientist to avoid the problems of strict empiricism while accounting for the necessary connecting principle.

We need to address one last interpretative problem with regard to Helmholtz's conception of causality, which is especially significant in the context of this discussion, although it has been largely neglected by the secondary literature. While the previous two problems referred to the way in which Helmholtz transformed the meaning of Kant's *a priori*, the next section will take a look at the way in which Helmholtz changes the function of the causal law, in accordance with his criticism of the Kantian concept of intuition.

4.6.2.3 Helmholtz, Schopenhauer and Intuition

In accordance with Kant's discursive understanding of the causal law, the category of causality is invoked to explain the transition from undetermined objects of sensibility (appearances) to the determined experience of events in time (see section 4.4.1). As was explained in section 4.6.2 in Helmholtz, by contrast, the causal law functions as a principle of determinability for underdetermined sensations, and as such, its operations logically precede (and indeed found the possibility of) what Kant called appearances. Hence, in Helmholtz's theorizing, the law is operative at a more primitive level of experience, i.e. it is a condition of possibility for an object *to be given*, a givenness that is presupposed in Kant's exposition of the principle in his *Second Analogy of Experience*. Helmholtz's use of the principle of sufficient reason should therefore be considered against the background of his criticism of Kant's doctrinal dualism concerning the two stems of knowledge, i.e. sensibility and understanding, or the passive and active faculties of the *Gemüth* respectively.

While Helmholtz presented his project as a 'redrawing' of the Kantian borderline between the matter and the form of experience (see chapter 3, section 3.6.2), a closer analysis reveals that this so-called 'redrawing' amounted to much more than a simple relocation. The Kantian system is improved above all, Helmholtz states, through "the resolution of the concept of intuition into the elementary processes of thought."⁶³⁴ In an earlier lecture, Helmholtz had likewise expressed his scepticism over the seemingly 'effortless' way in which the object is given in Kant's intuition, as if it were a case of mere receptivity.⁶³⁵ At this point, the focus of Helmholtz's revisionary project thus shifts

⁶³⁴ Helmholtz (1995 [1878b]), p. 364.

⁶³⁵ See Helmholtz (1995 [1878b]), p. 355: "the older concept of intuition [...] recognizes that as given by intuition whose representation comes to consciousness immediately with the sense impression and without recollection and effort." Also see Helmholtz (1969 [1894]), p. 253-254.

from a demarcation to a scrutiny of the concept of intuition itself, as this statement from 1892 shows:⁶³⁶

Kant [...] condensed into one act, which he named intuition, all the connecting links between pure sense perception and the formation of ideas of the perceived, spatially extended object. This plays a role for him [...] as if it were merely the result of a natural mechanism that could not be an object of further philosophical and psychological investigations.

In an article published a few months before his death, Helmholtz reiterates that his psychological theory rejects the concept of intuition as that by means of which “the idea of the object leaps into consciousness.”⁶³⁷ As already said, Helmholtz was not at all the only one to criticize Kant’s dualistic scheme of knowledge. Schopenhauer, for example, had likewise contended that Kant had not been critical enough with respect to the passive side of the *Gemüth* (sensibility), through which objects are ‘given’ “as if it were by virtue of a miracle, a matter of receptivity, coinciding with sensation.”⁶³⁸ Actually, in this respect, a short discussion of Schopenhauer’s criticism of Kant, and especially his revision of Kant’s conception of causality, will be instructive, as the former accused Helmholtz of plagiarizing his work.

Soon after Helmholtz gave his 1855 lecture ‘On Human Vision’ [Über das Sehen des Menschen], it was published as a pamphlet, and under that form caught the attention of Julius Frauenstädt, one of Schopenhauer’s pupils. Frauenstädt reviewed the young scientist’s work approvingly for the journal *Europa*, and pointed to the striking parallels with Schopenhauer’s revision of Kant’s principle of sufficient ground as presented in his 1813 *On the Fourfold Root of the Principle of Sufficient Reason*.⁶³⁹ When yet another one of Schopenhauer’s students, Johann August Becker, likewise alerted his teacher of Helmholtz’s 1855 lecture, Schopenhauer replied that:⁶⁴⁰

Somebody like that [Helmholtz] [...] has not read Kant, but rather ascribes [...] to him [Kant] what he has learned from me, without mentioning me. As you know, in Kant’s work, the external world readily passes through the senses and enters the head. [...] Helmholtz merely had the intention [...] of establishing himself at all costs, and precisely to that end, does not credit others, even though he steals from them. Even half of his title was taken from me.

⁶³⁶ Helmholtz (1995 [1892]), p. 394.

⁶³⁷ Helmholtz (1969 [1894]), p. 254.

⁶³⁸ Schopenhauer (1986 [1813]), p. 102-103 [my translation].

⁶³⁹ Conrat (1903), p. 236 [my translation].

⁶⁴⁰ Schopenhauer, letter to Becker (January 20th, 1856), as quoted in Conrat (1903), p. 238-239 [my translation]. In the last sentence, Schopenhauer most probably refers to his 1816 *Über das Sehn und die Farben*.

Subsequently, Schopenhauer sent a copy of the letter to Frauenstädt, who was finishing his *Der Materialismus. Seine Wahrheit und sein Irrthum* (1856) at that time, adding that “Helmholtz [...] ascribes to Kant, what belongs to me.”⁶⁴¹ Frauenstädt, in his turn, took up this accusation in his *Der Materialismus*, in which he states that it is difficult to believe that “Helmholtz [...] had not known or learned from” Schopenhauer’s work.⁶⁴² Eventually, the latter work fell into the hands of Helmholtz’s father, a college acquaintance of Schopenhauer, who updated his son on the whole matter.⁶⁴³

Frauenstädt accuses you of taking what say in your lecture [...] from Schopenhauer, without [...] referring to the latter. However, what he states on that topic is partially derived from Kant’s, partially from Fichte’s lectures, [...] that Schopenhauer and I attended at the same time.

In a reply to his father, Helmholtz politely praises Schopenhauer for his return to the “old, healthy standpoint of Kant,” but emphasizes the Kantian pedigree of his own conception of causality.⁶⁴⁴ In a letter a few months later – during which Helmholtz had apparently acquainted himself with some of the works of the post-Kantian – this initial positive attitude towards Schopenhauer had faded away, and Helmholtz now claims that he “thoroughly disliked everything he read” of the man.⁶⁴⁵

In itself, this peculiar incident has been generally belittled in the secondary literature and ascribed to Schopenhauer’s difficult persona and ‘inflated ego’.⁶⁴⁶ Given the lack of evidence, the case for Helmholtz’s alleged plagiarism is not quite compelling, nor very interesting. However, up until today, Schopenhauer and Helmholtz are frequently mentioned together when it comes to their conception of the causal law, and its role in

⁶⁴¹ Schopenhauer, letter to Frauenstädt (January 31st, 1856), as quoted in Conrat (1903), p. 239 [my translation].

⁶⁴² Frauenstadt cites this particular passage of Helmholtz’s work (Frauenstädt (1856), p. 52; Helmholtz (1896 [1855]), p. 115-116 [my translation, boldface added]): “We never perceive external objects immediately, but only their effects upon our nervous system [...].What **first** enables us to pass from the world of nervous sensations into the world of actuality [Welt der Wirklichkeit]? Obviously this is only possible by virtue of a judgment; we have to presuppose the presence of external objects as the cause of our nerve excitations, as there can be no effect without a cause.”

⁶⁴³ Ferdinand Helmholtz, letter to Hermann von Helmholtz (September 27th, 1855), as quoted in Koenigsberger (1902/1903), p. 276 [my translation].

⁶⁴⁴ Hermann von Helmholtz, letter to Ferdinand Helmholtz (December 31st, 1855), as quoted in Koenigsberger (1902/1903), p. 284 [my translation].

⁶⁴⁵ Hermann von Helmholtz, letter to Ferdinand Helmholtz (March 4th, 1856), as quoted in Koenigsberger (1902/1903), p. 291 [my translation].

⁶⁴⁶ Conrat (1903), Riehl (1904), Erdmann (1921), Hörz & Wollgast (1979) and Hörz (1995).

experience.⁶⁴⁷ Admittedly, although the latter explicitly rejected the former's philosophical work in general – which is not surprising, given its robust metaphysical character – it is possible to discern some similarities between the two authors in their use of the causal law.⁶⁴⁸ Not only is the causal law the sole Kantian category that is retained in both Helmholtz's and Schopenhauer's work, more importantly, both authors are on a par when they assign a pivotal role to causality in trying to account for the way in which the object is *given* in sensibility.

As an admirer and pupil of Goethe, Schopenhauer not only adopted the concept of *physiological* colors (see chapter 2), but was likewise very firm in his insistence on the purely subjective (or fundamentally underdetermined) nature of every sensation:⁶⁴⁹

[W]hat a meager thing is pure sensation! [...] Every kind of sensation, is, and always will be, a process taking place within the organism, and as such, is limited to the realm under the skin; therefore, it cannot contain anything beyond this region [jenseit dieser Haut] [...]. [...] [T]here is never anything objective in sensation.

After denouncing the lack of intrinsic referentiality in sensation, Schopenhauer goes on to attack Kantian concept of intuition as utterly unintelligible.⁶⁵⁰ In sharp contrast to the latter, Schopenhauer contended that at least some degree of conceptual determination – which in Schopenhauer's case can be identified entirely with the causal form of understanding – has to be presupposed on the level of sensibility, to explain how something can be *given* at all.⁶⁵¹

It is only when the understanding [...] begins to act, and applies its sole form, the law of causality, that a powerful transformation takes place, and subjective sensation is turned into objective intuition. That is to say, by virtue of its peculiar form, and hence *a priori*, it determines [...] bodily sensation as an effect (a word, which it alone understands) that must have a cause [...]. Therefore, this operation of understanding [...] is not a discursive, reflective one [...] but intuitive and immediate.

⁶⁴⁷ See among others Liebmann (1869), Riefert (1984), Pastore (1978; 1993), Smith (2002). Zöllner (1872, p. 345-350) presented a five-page analysis of the similarities between both authors in this respect, by matching quotations from Helmholtz's work with quotations from Schopenhauer.

⁶⁴⁸ That Helmholtz was not at all fond of Schopenhauer's metaphysics, is clear for example in his (1995 [1877a], p. 314) statement that "the unconscious will of Schopenhauer" is nothing but an illegitimate "psychological anthropomorphism" projected onto the natural realm.

⁶⁴⁹ Schopenhauer (1986 [1813]), p. 68 [my translation].

⁶⁵⁰ This is also clear in his statements to Becker, as quoted above.

⁶⁵¹ Schopenhauer (1986 [1813]), p. 69 [my translation].

As such, Schopenhauer emphasized the intellectual nature of intuition [Intellektualität der Anschauung].⁶⁵² That is to say, in his work, the law of causality is transformed into an intellectual function of intuition, which moreover has logical priority over the spatial form of perceptions. It is only after determining sensation as an effect, Schopenhauer writes, that the process of constructing causes in space – and thus external to the organism – takes place.⁶⁵³ In reinterpreting the causal law as a constitutive element of intuition, Schopenhauer feels he has overcome the dogmatic, or in his own words, ‘miraculous’ nature of Kantian intuition, and he concludes that “intuition is essentially the work of understanding.”⁶⁵⁴

Although Helmholtz is not as explicit as Schopenhauer in this respect, his mere definition of the law of causality as that which first enables us to escape the world of our nervous system, indicates a revision of Kant’s exposition of the law that is quite close to Schopenhauer’s. In Helmholtz’s theory, receptivity in the Kantian sense presupposes thought, *albeit unconsciously*, and more particularly, causal inference. As we have seen, Helmholtz’s causality does much more than connect disparate sensations: it finds the signaling function of the sign, and, as such, is a condition of possibility for the transcendent reference of perception. As has been suggested, it is at this point that his psychological theory can be said to bear some resemblance to Schopenhauer’s analysis, although one should not exaggerate the similarities between the two authors.⁶⁵⁵

This quite lengthy discussion of Helmholtz’s conception of the causal law automatically leads us to consider the limits of his adherence to Kant’s transcendental analysis of experience. Once on this path, the logical next step to take is that of Helmholtz’s notorious refutation of Kant’s doctrine of space, which, more than anything else, is revealing of Helmholtz’s endeavor to “correct Kant, where he had not been critical enough.”⁶⁵⁶ Only after this discussion, which is the subject of the next section, can we get a clear picture of the scope and purport of Helmholtz’s ‘intellectual leap’ to Kant, and establish its systematic significance for his psychology of the object.

⁶⁵² Schopenhauer (1986 [1813]), p. 67 [my translation].

⁶⁵³ *Ibid.*

⁶⁵⁴ *Ibid.* p. 100.

⁶⁵⁵ The similarities between Schopenhauer and Helmholtz in their explanation of perceptual reference, have been pointed out by Pastore (1978, 1993) and Smith (2002). Both authors agree, however, that this causalism does not sufficiently account for the possibility of externalisation, and credit Helmholtz for taking his analysis one step further, and more particularly, for his stress on the pivotal role of voluntary action in internal-external differentiation (see chapter 5).

⁶⁵⁶ Helmholtz (1883 [1878a]), p. 660.

4.6.3 Helmholtz's Space

One of the most prominent topics in discussions on the intellectual relation between Helmholtz and Kant has always been the former's refutation of the latter's treatment of Euclidean space as the *a priori* form of outer intuition.⁶⁵⁷ In the 1860s and 70s, Helmholtz set out to demonstrate the factual [Thatsächliche], or empirical basis of the axioms of geometry, in a series of papers that take Kant as a main antagonist. Helmholtz (1878b) claims that:⁶⁵⁸

Kant was influenced in his claim that spatial relations which might contradict Euclid's axioms cannot even be imagined – just as he was in his overall view of intuition as a simple, not further reducible mental process – by the then current state of mathematics and sensory physiology.

So Helmholtz's attempt to correct Kant did not only pertain to the latter's concept of intuition, but likewise, and more importantly so, to his transcendental account of space. Contrary to the available knowledge of geometry in Kant's time, Helmholtz had a large body of evidence at his disposal – e.g. the works of Riemann, Lobatsjevski, Beltrami, etc. – which demonstrated the logical possibility of non-Euclidean systems of geometry.

Helmholtz's main argument, however, pertained not only to logical possibility (i.e. the conceivability) of alternative geometrical systems, but rather their imaginability [Vorstellbarkeit] for “beings whose powers of reason are quite in conformity with ours.”⁶⁵⁹ In his criticism of Kant, Helmholtz therefore starts from the conditional statement that “if we can imagine [...] spaces of other sorts,[...] it cannot be maintained that the axioms of geometry necessarily follow from an *a priori* given transcendental form of our intuition [...]”⁶⁶⁰ In other words, Helmholtz maintained that if it is possible to imagine the kind of sensible experiences that would be had in a non-Euclidean space, it follows that spatial structure is not a necessary form of outer intuition, but a contingent, i.e. empirically constructed, aspect of experience.⁶⁶¹

In tackling the question concerning the aprioricity of space, Helmholtz's point of departure was explicitly psychological, i.e. his interest in the nature of geometry derived from his research on the origin of spatial localization and the “genesis of

⁶⁵⁷ See below.

⁶⁵⁸ Helmholtz (1995 [1878b]), p. 353. Also see Helmholtz (1883 [1866, 1868, 1878a], 1995 [1870], 1896).

⁶⁵⁹ Helmholtz (1995 [1870]), p. 231; Helmholtz (1995 [1878b]), p. 353. Also see Hatfield (1985, 1990), Stromberg (1989).

⁶⁶⁰ Helmholtz (1995 [1870]), p. 239.

⁶⁶¹ *Ibid.*; Hyder (1999), p. 273.

general spatial perception.”⁶⁶² The crucial question at stake for him, was thus whether the metric system of Euclidean geometry – as a system of principles that provides the basic rules for spatial measurement – provides the exclusive, necessary ground of spatial localization, or whether spatial determination would be possible (i.e. imaginable) for human beings in a geometrical system that describes an alternative space, and hence, prescribes alternative principles for spatial measurement.⁶⁶³ In accordance with Helmholtz’s definition of representation as anticipation (see chapter 3), the answer to the latter question would be positive if the scientist were able to describe “the whole series of sensible impressions that would be had in such a case.”⁶⁶⁴

Subsequently, Helmholtz attempts to demonstrate that such alternative spatial structures would in fact be imaginable [Vorstellbar], by means of a series of thought experiments – inspired mainly by Beltrami’s work – in which he determines the possible perceptions a person would have when moving about in a non-Euclidean space. ‘Euclidean perceivers’ that are transported into a pseudospherical world, according to Helmholtz, would be able to adapt the rules of spatial determination – i.e. their intuitive geometry – by means of active experimentation and bodily movement.⁶⁶⁵ What these experiments demonstrate, according to Helmholtz, is that the metric system by which the position and distance of objects in visual space is determined, is not *a priori*, nor inborn, but acquired through bodily movement: “our body with its organs is the instrument we carry about in space. Now it is the hand, now the leg, that serves for a compass, or the eye turning in all directions [...] for measuring arcs and angles in the

⁶⁶² Helmholtz (1883 [1866]), p. 610; also see Neuber (2012), p. 169: “For Helmholtz’s ‘inherently Kantian theory of space’ is nothing but a theory of *space perception*.”

⁶⁶³ As such, Helmholtz’s argument against Kant is directed especially towards the latter’s claims with regard to the apriority of the mathematical determination of space (see section 4.6.3), and Helmholtz’s main argumentative strategy pertains to the imaginability of alternative spaces for the subject. For example, Helmholtz argues that we can give ourselves an object in intuition, that is not determined according to the Euclidean geometrical system.

⁶⁶⁴ Helmholtz (1995 [1870]), p. 229.

⁶⁶⁵ See for example Helmholtz (1995 [1870]), p. 241-242 [boldface added]: “We can [...] infer how the objects in a pseudospherical world, were it possible to enter one, would appear to an observer, whose eye-measure and experiences of space had been gained like ours in Euclid’s space. [...] [H]e would think he saw the most remote objects round about him at a finite distance [...]. But as he approached these distant objects, they would dilate before him, though more in the third dimension than superficially, while behind them they would contract. **He would know that his eye judged wrongly.** If he saw two straight lines which in his estimate ran parallel for the hundred feet to his world’s end, he would find on following them that the farther he advanced, the more they diverged, because of the dilatation of all the objects to which he approached.”

visual field.”⁶⁶⁶ In conclusion, Helmholtz argues that the ability for spatial determination is a contingent, *a posteriori* element of perceptual experience:⁶⁶⁷

[W]e can infer [...] the series of sensible impressions which a spherical or pseudospherical world would give us, if it existed. In doing so, we nowhere meet an inconsistency or impossibility [...]. We can represent to ourselves the look of a pseudospherical world [...] Therefore, it cannot be allowed that the axioms of geometry depend on the [...] form of our perceptive faculty.

One of the crucial hypotheses underlying this empirical account of spatial construction is the principle of *the free mobility of rigid bodies*. In psychological terms, this implies that given Helmholtz's conception of the body as a measurement instrument, its reliability depends on its rigidity in space and time, i.e. on the presumption that its form is constant when subjected to temporal and spatial variations. The measurement process, in turn, is dependent on bodily movement, i.e. on the condition of free mobility.⁶⁶⁸ As Cassirer noted, Helmholtz thus accounts for the metric determination of space in terms of an 'unconscious mathematics', and therefore, he paraphrases Helmholtz's doctrine as *Cum homo calculat, fit spatium* " [as man calculates, so the world is made].⁶⁶⁹

The impact of Helmholtz's empirisation (or rather psychologization) of the axioms of geometry can hardly be overestimated. The stakes of the debates that arose in the wake of Helmholtz's refutation of Kant's transcendental doctrine of space were very high, as is reflected by the quite dramatic tone of the introduction to Krause's 1878 *Kant und Helmholtz*:⁶⁷⁰

Helmholtz has affected Kant's system in its foundations, when he denied the invariable and [...] apodictic nature of the axioms of geometry [...]. If Helmholtz is right, and if indeed, the Kantian foundation is false, it follows that the content and

⁶⁶⁶ Helmholtz (1995 [1870]), p. 240.

⁶⁶⁷ Helmholtz (1995 [1870]), p. 243.

⁶⁶⁸ Helmholtz (1977 [1868]), p. 42-43: "The existence of mobile but rigid bodies, or point systems, is presupposed, such as is needed to enable the comparison of spatial magnitudes by congruence. [...] [T]he definition of a fixed body can only be the following [...]: between the 2n coordinates of any point pair belonging to a body fixed in itself, there exists an *equation* which is *independent* of the motion of the latter, and which for all congruent point pairs is the same. [...] *Completely free* mobility of fixed bodies is presupposed. It is presupposed, in other words, that any point in them can move continuously to the place of any other, to the extent that it is not restricted by the equations that exist between it and the remaining points of the fixed system to which it belongs."

⁶⁶⁹ Cassirer (1944), p. 18. This is a variation on the old theme "Cum Deus calculat, fit mundus" [As god calculates, so the world is made].

⁶⁷⁰ Krause (1878), p. 1.

method of Kant's system likewise fail [...]. In that case [...] German philosophy has erred for the last century [...], and we can do nothing but send the German youth back to the school of the English to study philosophy; a philosophy that Kant and his followers had supposedly refuted or corrected.

Helmholtz, so it seems, had dropped a bomb on the Kantian system, and in doing so, cleared the way for the hegemony of empiricism in philosophical thought. This, however, was not Helmholtz's aim, who maintained that by emptying the Kantian forms of intuition, he was merely correcting Kant where he had not been critical enough:⁶⁷¹

Kant's theory of the *a priori* given forms of intuition is a very apt and clear expression of the relations of things; but these forms must be without content and sufficiently free [...]. The axioms of geometry [...] limit the form of intuition of space in a way such that if geometry is to be generally applicable to the real world, then no longer can any imaginable content be included in it. If we eliminate the axioms, then the theory of the transcendality [sic] of the form of intuition of space is completely inoffensive. Kant has here, in his *Critique*, not been critical enough [...].

In other words, according to Helmholtz, Kant had erred not so much in assuming that space in general is the necessary *a priori* form of intuition – i.e. in assuming the aprioricity of a “purely formal scheme” – but rather in including “certain peculiarities of the scheme” in his transcendental theory.⁶⁷² By taking the principles of spatial structure to be *a priori*, Helmholtz contends, Kant falls back into the dogmatic assumption of a pre-established harmony between the form of thought and the external world, and because of this, his philosophical arguments against Kant's transcendental theory of space are very similar to the ones he presented earlier against the nativist

⁶⁷¹ Helmholtz (1995 [1878b]), p. 380.

⁶⁷² Helmholtz (1995 [1870]), p. 226: “It [i.e. Kant's transcendental theory] appears thereby to postulate, for this *a priori* form, not only the character of a purely formal scheme of itself quite unsubstantial, in which any given result experience would fit; but also to include certain peculiarities of the scheme, which bring about that only a certain content, and one which, as it were, is strictly defined, could occupy it and be apprehended by us.” Also see Kitcher (1990), p. 7: “Kant's metaphysical claims about the forms of intuition and the overall importance of the doctrine were undercut by the discovery that physical space is not Euclidean. Nevertheless, the psychological aspect of Kant's position could still be true, as others have noted. He could be right that Euclidean space is the form of human perception. As Helmholtz candidly admitted, he could not make a conclusive case against Kant's position.” Although Kitcher is right in attenuating Helmholtz's criticism of Kant, it is questionable whether Helmholtz was willing to accept the psychological aprioricity of Euclidean space, as she suggests. In fact, the contrary seems to be the case: as argued below, Helmholtz guarded his psychology of perception against every *a priori* metric specification of space, and rather pinpoints the *free mobility of rigid bodies* as the transcendental condition for spatial construction. Free mobility, however, is the condition of possibility for the determination of not only Euclidean, but also pseudospherical space, for example.

hypothesis (see chapter 3).⁶⁷³ Hence, while Helmholtz vehemently denied that the mathematical determination of space is *a priori*, he explicitly added that this does not in itself affect the hypothesis regarding the constitutive nature of space as a general form of external intuition. On the contrary, Helmholtz even states that “space can be transcendental, while the axioms are not,” and concludes that the Kantian hypothesis of the aprioricity of space is “completely inoffensive”, as long as it pertains only to a purely formal scheme, devoid of metric specifications.⁶⁷⁴ But what does this mean, particularly in the context of Helmholtz’s psychological theory?

Helmholtz’s empirical account of spatial measurement amounts to the following psychological approach to spatial determination:⁶⁷⁵

It is easy to appreciate that by moving the [...] finger along the objects, the sequence in which the impressions of the object are presented becomes known; that this sequence shows itself to be independent of whether one feels with this or with that finger; [...]. [...] and different tangible surfaces require different motions in order to glide along them [...]. In such a way may knowledge of the spatial ordering of things existing beside one another be acquired. [...] [T]his observed spatial order of things originally derives from the sequence in which the qualities of the sensation present themselves to the moved sensory organ.

Helmholtz thus conceives of spatial determination as empirical, as it is mediated by active experimentation. As such, Helmholtz’s ‘correction’ of Kant in this respect basically comes down to a displacement of spatial structure from the *a priori* form of intuition, to its *a posteriori* content. Furthermore, it should be noted that this displacement does not annihilate Kant’s theory as such; rather, the *a priori* element of spatial perception is shifted to the condition of *the free mobility of rigid bodies*.⁶⁷⁶

As Helmholtz notes, one could consider the notion of rigidity as “transcendental in Kant’s sense, namely as formed independently of actual experience,” and of the hypothesis of free mobility as denoting the *a priori* form of intuition.⁶⁷⁷ In other words, the hypothesis of the free mobility of rigid bodies and the empirical theory of spatial perception relate to each other respectively as the general theory of space, and the

⁶⁷³ Helmholtz (1995 [1870]), p. 245.

⁶⁷⁴ Helmholtz (1995 [1878b]), p. 352, 363.

⁶⁷⁵ Helmholtz (1995 [1878b]), p. 351-352.

⁶⁷⁶ In this respect, see Neuber (2012), who offers a very interesting analysis of this ‘displacement’ of the *a priori* in Helmholtz’s theory of space.

⁶⁷⁷ Helmholtz (1995 [1870]), p. 244: “Taking the notion of rigidity thus as a mere ideal, a strict Kantian might certainly look upon the geometrical axioms as propositions given, *a priori*, by transcendental intuition, which no experience could either confirm or refute, because it must first be decided by them whether any natural bodies can be considered as rigid.” Also see Helmholtz (1995 [1878b]), p. 349.

particular theory of spatial measurement. While spatial construction is a contingent, a *posteriori* aspect of experience, the *determinability* of space is founded in the non-empirical condition of the *free mobility of rigid bodies*.⁶⁷⁸

But what is the question of ‘space in general’ – as distinguished from the question of spatial determination – in Helmholtz’s thought, and more importantly, how does it relate to his psychological theory? If the free mobility of rigid bodies is determined as the *a priori* form of intuition, i.e. as a condition of possibility for a spatial object to be given, what does this mean? This is where Helmholtz’s theory becomes especially interesting for our discussion. As Kant famously argued, space in general is a condition of possibility for “sensations to be related to something outside me [...] thus in order for me to represent them as outside.”⁶⁷⁹ For Helmholtz too, the question of space is intrinsically related to the question concerning the conditions underlying the representation of objects as external. As Heyfelder notes,⁶⁸⁰

[t]he core of his [i.e. Helmholtz’s] research interest [...] pertained primarily to the genesis of our consciousness of an external world, [...] opposed to the inside world [...]. But as the external world was a spatial world in his conception, his second concern was to establish how we come to know this objective space.

As such, Helmholtz’s question regarding the genesis of space, is closely related to that of objectification. In other words, to say that something is spatial, is to say that something is out there, as opposed to the internal world of self-consciousness:⁶⁸¹

[W]e understand as the external world precisely what we perceive as spatially determined. That which has no perceptible spatial relation, we conceive as the world of inner intuition, as the world of self-consciousness.

Gradually, it thus becomes clear that the problem of space, in Helmholtz’s thought, is closely related to the problem of differential consciousness in perception, insofar as the latter is defined in terms of a geometrical opposition between the spatial external world

⁶⁷⁸ See for example Neuber (2012), p. 168-169: “The axioms of geometry, Helmholtz maintains, are embodied in the system of spatial measurement. Therefore, he thinks that they are not synthetic *a priori*. On the other hand, space itself is for Helmholtz the precondition (or, in Kantian terminology, the “condition of possibility”) of all measurement and, consequently, of the axioms of geometry as well. [...] [T]he general concept of space (‘space itself’) can be characterized by an overarching feature, namely by the free mobility of rigid bodies. [...]. Space – via its overarching feature of free mobility – is for Helmholtz ‘a given form of intuition, possessed prior to all experience’, and therefore transcendental.”

⁶⁷⁹ CPR [A23/B38].

⁶⁸⁰ Heyfelder (1999), p. 19 [my translation]. Also see Heidelberger (1999).

⁶⁸¹ Helmholtz (1995 [1878b]), p. 349.

and the non-spatial internal realm of self-consciousness. The relevance of the question of space for Helmholtz's psychological theory ultimately comes down to the conditions underlying the "separation of thought and reality."⁶⁸² In other words, the most tantalizing question is that of what "produces the notion of separation in space?"⁶⁸³ Indeed, the problem at stake pertains to that which we have put forward as the 'aporetic corner' of Kant's analysis, i.e. the problem of difference.⁶⁸⁴

Kant [...] designates [...] space as the [...] form of outer intuition. [...] Even here the natural scientific view can, up to a certain point, go along [...] [I]f we ask whether there is a marker which is common and perceptible by direct sensation, through which every perception relating to objects in space is characterized, then we find, in fact, one such a marker in the circumstance that the movement of our body places us in other spatial relationships [...]. The impulse to movement that we give through innervation of our motor nerves, **is something directly perceivable** [...]. If we now make such types of impulses – take a look, move the hands, go back and forth – then we find that the sensations belonging to certain quality circles – [...] those belonging to spatial objects – can be changed; while other mental states [...] cannot at all. **A decisive distinction** between the former and the latter is thus posited [...].

In this passage, the displacement of the transcendental of space to the condition of free mobility becomes especially tangible. Furthermore, the determination of the object *qua* external object, is said to be dependent on the self-relating structure of the will's impulse, as is implied by Helmholtz's remark on the direct perceivability of the will's impulse. As such, geometrical opposition supervenes on a dynamical opposition, i.e. the spatial and the non-spatial are distinguished by means of the awareness of what the will can, and cannot change, and as such, in accordance to the scheme of will and resistance. Although this process of differentiation in perception through voluntary movement is an empirical one, the *determinability* of the object, *qua* external object, is founded in the possibility for voluntary movement. Consequently, Helmholtz concludes that⁶⁸⁵

[...] space would be a [...] form of intuition prior to all experience insofar as its perception would be tied to the possibility of the will's motoric impulses, and for which the mental and corporeal ability must be given us through our organization before we can have spatial intuition.

⁶⁸² Helmholtz (1995 [1878b]), p. 362.

⁶⁸³ Helmholtz (1995 [1868]), p. 176.

⁶⁸⁴ Helmholtz (1995 [1878b]), p. 348-349 [boldface added].

⁶⁸⁵ Helmholtz (1995 [1878b]), p. 349.

A bit further, he reiterates that only through voluntary movement can a perceiver differentiate between⁶⁸⁶

[t]hose changes which we can bring forth and annul by conscious impulses of the will [...] from those which are not consequences of the will's impulses and cannot be overcome by such. The latter finding is negative. Fichte's appropriate expression for it is that a Non-Ego forces recognition of itself vis-à-vis the Ego.

Helmholtz's reconsideration of Kant's transcendental theory of space thus comes down to an empirization of spatial construction on the one hand, and a naturalization of the *a priori* on the other. More particularly, as was the case with Helmholtz's appropriation of the causal law, his rethinking of the aprioricity of space in terms of bodily movement likewise entails a transformation of the *a priori* from a purely formal element, into an aspect of a perceiver's – defined as an agentive and goal-directed living being – 'mental and corporeal ability'.

Moreover, this discussion of Helmholtz's theory of space is helpful for acquiring a better grip on the conceptual intertwinement of cause and force, specifically within his psychological theory.⁶⁸⁷ As was outlined in the first chapter, Helmholtz relates the concept of cause to that of *force*, defined as "a power [...] ready to take effect [zu wirken bereit] in every moment where the conditions for its efficacy [Wirksamkeit] occur."⁶⁸⁸ Furthermore, it was explained that to say that the object exists, in Helmholtz's psychology, is to have determined it as the external cause of internally felt sensory modifications. We should now add that this causal attribution is crucially mediated by voluntary movement, due to which an external cause reveals itself first and foremost as a "power opposing us" [uns entgegentretende Macht]:⁶⁸⁹

[I]f [...] we recognize it [i.e. the flux of appearances] as something existing independently [...] we call it cause [...]. Insofar, [...] as we recognize the law [...] as a power equivalent to our will, we call it 'force'. This concept of a power opposing us is directly conditioned by the ways and means our simplest perceptions occur. [...] It is clear that the separation of thought and reality first becomes possible after we know how to complete the separation of that which the Ego can and cannot change. This, however, only becomes possible after we recognize which law-like consequences the will's impulses have at that time.

⁶⁸⁶ Helmholtz (1995 [1878b]), p. 351.

⁶⁸⁷ See chapter 1.

⁶⁸⁸ Helmholtz (1995 [1892]), p. 407; Helmholtz (1896 [1892]), p. 354; Also see Helmholtz (1995 [1869]), p. 209.

⁶⁸⁹ Helmholtz (1995 [1878b]), p. 362.

Here all the bits and pieces of Helmholtz's psychology start falling into place: while the perceptual process is governed by the *a priori* causal structure of understanding, the determination of the object as cause or *Ur-sache*, is in turn dependent on an act of differentiation, an *Ur-teilung* between the world of *Will* and that of *Force*.⁶⁹⁰ In this sense, Helmholtz indeed gives the mind a creative function in determining "not just the characteristics of external reality, but its independent existence as well."⁶⁹¹

As such, Helmholtz's analysis of the act of differentiation – which will be discussed in detail in the next chapter – can be understood as part of his attempt to analyze all of the mental acts involved in what Kant purportedly 'condensed in one act', i.e. in intuition. Therefore, his criticism of Kant's theory of spatial intuition can be related to his criticism of the Kantian notion of intuition in general.

In conclusion, it is clear that the focal point of Helmholtz's theory of spatial perception is not, as in Kant, the question regarding the transcendental character of space as such, but rather the question regarding the nature and structure of voluntary movement, which founds the possibility of perceptual differentiation. From Helmholtz's remarks on the central role of the direct perceivability of the will's impulse, it follows that his perceptual theory ultimately hinges on the presumption that a *perceiver* is first and foremost an *agent*, and knowingly so. Indeed, Helmholtz's psychology of the object is ultimately founded in an epistemic subject that is characterized by its ability to say: *I act*. Only on condition of the self-reflexive structure of voluntary action, can something appear as 'resistance', and can perceptual consciousness be determined in accordance to the dynamical scheme mentioned above. Consequently, this investigation automatically leads us to reconsider the question of the self-relating structure of the subject, and indeed, Kant's *I think*, which functions as the primordial act of spontaneity in the latter's transcendental analysis. In terms of Helmholtz's theorizing, to account for this fundamental self-relation, is to account for the physiological and psychological structure of agency in general, and the will's impulse in particular.

With this conclusion, we have at once sketched the broad outlines of the next chapter, in which Helmholtz's psychological account of the primordial act of differentiation will be analyzed, as well as the way in which this account marks a move

⁶⁹⁰ Also see Heyfelder (1897), p. 26; Heidelberger (1993, 1994).

⁶⁹¹ Turner (1977), p. 57. Turner likewise notes that Helmholtz's use of the causal law resonates with Fichte's: "From Kant, Helmholtz derived his early insistence on the transcendental and *a priori* nature of causality; but, the use he made of the causal law more closely paralleled the thought of Fichte. When our volitions do not produce the desired results, Helmholtz taught, or when changes occur in our sensations independent of our volitions, we posit the existence of objects external to ourselves so that these effects may have a cause." The discussion of the way in which Helmholtz's theorizing resonates with Fichte's, however, is reserved for the next chapter.

beyond the Kantian project, and rather points towards a rapprochement of Helmholtz's psychology with Fichte's metacritical analysis of experience.

4.7 Summary and Conclusion

In order to grasp the systematic significance of Helmholtz's allegiance to certain aspects of Kant's critical analysis of experience, this chapter started with an interpretation of Kant's work as a response to Hume's so-called 'labyrinth' with regard to the subject. First, we outlined Kant's diagnosis of Hume's problem. It was argued that from a Kantian standpoint, empiricism cannot *but* produce tautological accounts of the subject, as it searches for the conditions *of* experience *in* experience. As such, Hume's Labyrinth is a logical consequence of the empiricist framework itself.

Second, we discussed Kant's attempt to overcome this aporia through the transcendental doctrines of synthesis and apperception, that respectively address the problem of the necessary connecting principle and the unity of experience, that left Hume perplexed. In doing so, Kant shifted the scope from the empirical analysis of the psychological construction, to the necessary *a priori* structure of the experiencing subject. As a consequence of this shift in scope, the subject is at once transformed from a mere theatre of construction, to an organized and spontaneous being.

On the other hand, we have scrutinized Kant's concept of apperception, and explored the way in which it invites a further elaboration of the necessary structure of subjectivity in experience. It could be argued that by positing the *I think* as an ultimate principle, Kant simultaneously posited the *difference* between the thinking subject and the content of its thoughts, thus leaving the genesis and ground of differential consciousness unexplained. Therefore, Kant's apperception can be (and has been) the point of departure for a further articulation of *what the subject must be like* in order to address the problem of differentiation.

After discussing these elements and possible problems of Kantianism, we turned to the critical dimension in Helmholtz's psychology of the object. As is well known, Helmholtz was a self-professed Kantian in his use of the category of causality, that he did not consider to be a product of experience, but an *a priori* necessary organizing principle. We suggested that Helmholtz uses the apriority of causality to account for the signaling function of the sensation-sign. In his psychological account, the notion of 'cause' regulates the association of disparate sensations, and determines their ability to symbolize a unitary origin. 'Cause', in the sense, does not denote the temporal priority of the object over the state of excitation, but rather the organizational principle of the

mind, that grounds the comprehensibility of subjective states of functional activity in the nervous system. Hence, causal attribution in Helmholtz, is not primarily a reproductive, but an *a priori* productive activity, that grounds the possibility of perceptual experience and objectification.

In the context of this discussion, we were inevitably faced with the way in which Helmholtz's psychological adaptation of Kant's formal principle of causality, affected the meaning of the *a priori*. More particularly, we discussed the evolution in Helmholtz's conception of the causal law, and pinpointed the gradual dissociation of epistemological objectivity and psychological necessity as one of the distinctive characteristics of his changing views in this respect. More importantly, however, we have studied the peculiar polemics between Schopenhauer and Helmholtz, in order to shed light on yet another difficulty with respect to the interpretation of Helmholtz's Kantian inspired causalism. To be precise, we argued that in Helmholtz's psychological theory, the causal law functions as a constitutive principle for receptivity itself, and thus overthrows Kant's distinction between receptivity and spontaneity, the given and the constituted, or the active and passive side of the *Gemüth*.

Subsequently, we considered Helmholtz's revision of Kant's theory of space in light of his dissatisfaction with Kant's doctrinal dualism. In doing so, we found that Helmholtz's criticism of Kant's space (i) was motivated at least partially by an attempt to overcome the latter's strict distinction between passivity and activity, and (ii) opened up the way for an in-depth psychological analysis of the origin of differentiability in perception.

As such, this chapter not only pinpointed the way in which Helmholtz transgressed the pure empiricist framework by taking recourse to a Kantian inspired account of subjective spontaneity, it likewise provided us with fertile ground for yet a further articulation of the necessary structure of subjectivity. Through Helmholtz's revision of Kant's theory of space, a principle emerged that is foundational with respect to his entire psychology of the object, namely the principle of the *free mobility of rigid bodies*, that founds the ability for differentiation. As will be argued in the next chapter, the introduction of this principle marks Helmholtz's departure from a critical, to a metacritical level of analysis, that resonates with Fichte's Ego-doctrine.

Chapter 5

Helmholtz's Intellectual Leap (II): In the Beginning was the Act

*I can **move**, because I can move. This proposition is not a tautology*

- Erwin Straus (1935), p. 425.

5.1 Introduction

In the previous chapter, we discussed Helmholtz's criticism of Kant's concept of intuition, and the interrelated problem of dualism within Kant's system. The purport of this criticism with regard to the problems of perception and objectification can hardly be overestimated. The unanalyzed assumption of an object-subject dualism – and the hypothesis of a primitive moment of passive affection – leaves the foundational dynamics of perceptual differentiation unexplained. In terms of Helmholtz's psychology, the problem at stake can be reformulated as follows: given that the image of the object arises from causal determination, it still remains unclear what founds the possibility of the dual consciousness of causes and effects.

We therefore have to consider a final level of analysis in Helmholtz's psychology, that starts out from a *critique* of Kant, and is continuous with the metacritical idealist system of Fichte. More particularly, in this chapter we should go into the philosophical background of Helmholtz's perspective on the foundation of geometrical and dynamical opposition in perception. As will become clear, this entails a further exploration of the constitutive role of voluntary action, as it was discussed at the end of chapter 4.

In this chapter, the scope shifts from the analysis of the conditions underlying perceptual synthesis to those determining the possibility of what Kant called *apperception*. In other words: the central question now becomes that of the structure of the irreducible self-relation expressed in the *I think*, and of how this self-reflexivity founds the possibility of objectification.

It is clear that at this point, we have reached a quite high level of abstraction. By turning to Fichte and his transcendental *metacritique*, it seems we are far removed from the subject in its spatiotemporal determination, with its physical body, and its concrete experiences. This is, however, not quite the case. As will become clear at the end of this chapter, the detour through Fichte's Ego-doctrine leads us right back to a consideration of Helmholtz's psychophysiological analysis of the experiencing body. More particularly, it will be argued that Helmholtz's account of the physiological structure of agency was ultimately informed by the idealist idea of *the striving subject* as the foundation of experience and knowledge.

This chapter will be organized as follows:

- (1) First, a preliminary discussion is presented of the way in which Helmholtz's psychology of perception can be related to J.G. Fichte's work (section 5.2).
- (2) Second, the concept of '*metacritique*' is explained, specifically in its Fichtean elaboration (section 5.3). Fichte's metacritical analysis of experience will be discussed by subsequently going into (i) the way in which his philosophy can be read as a philosophy of difference (section 5.3.1), (ii) his metatheoretical view of the subject as a practical, striving being (section 5.3.2), and (iii) the way in which (i) and (ii) are articulated in his work 'The Facts of Consciousness' [die Thatsachen des Bewusstseyns] (section 5.3.3).⁶⁹²
- (3) Third, we will take a look at the way in which Fichte's idealist theory of subjectivity determines his particular view of the body (section 5.5). Going into Fichte's conception of the body could prove to be valuable in facilitating the transition from the idealist theory of subjectivity, to Helmholtz's psychophysiological analysis of the perceptual process.
- (4) Subsequently, a more in-depth analysis is presented of Helmholtz's relation to Fichte. In this part, possible objections against this alleged continuity are first outlined, and overcome (section 5.5).

⁶⁹² Fichte (2008 [1817]).

- (5) Finally, textual evidence for Helmholtz's indebtedness to Fichte is presented (section 5.6), and the metacritical dimension of Helmholtz's philosophy (section 5.6.1) and physiology (section 5.6.2) is outlined.

5.2 Helmholtz and Post-Kantian Idealism: Preliminary Remarks

Although post-Kantian philosophers such as Fichte, Schelling and Hegel commonly placed themselves in the tradition of Kant, their work was received by many as a grotesque perversion of the critical system. In fact, it seemed as if post-Kantian metaphysical systems erased all traces of *critique* in the Kantian sense, i.e. as a philosophical project that aims to limit “the speculative use of reason.”⁶⁹³ A prototypical example of the nineteenth-century anti-metaphysical scientist, Helmholtz seized every possible opportunity to criticize post-Kantian idealism in general, and Hegelian philosophy in particular, and reproached its bold endeavor to derive truth from nothing but pure thinking itself.⁶⁹⁴ As will be explained in the course of this chapter, however, Helmholtz's attitude towards J.G. Fichte's philosophical work was much less straightforward as it might seem at first. As Turner has noted, Helmholtz apparently distinguished between “two aspects of Fichte's thought,” and accepted Fichte's philosophy to the extent that it “represented a phenomenology of consciousness,” while he “resolutely rejected Fichte's [...] attempts to build an idealist metaphysics on that basis.”⁶⁹⁵ In this chapter, it will be demonstrated that Helmholtz's work indeed supports the hypothesis of a *restricted* indebtedness to Fichte's philosophy. While Helmholtz despised metaphysics, and thus also ‘Fichte the metaphysician’, the same does not hold for his attitude towards ‘Fichte the philosopher of mind’. Actually, a closer analysis of Helmholtz's theorizing even reveals that Fichte's Ego-doctrine might well contain the

⁶⁹³ CPR [BXXV].

⁶⁹⁴ See for example Helmholtz (1995 [1862]), p. 79: “The ‘philosophy of Identity’ was bolder. It started with the hypothesis that not only spiritual phenomena, but even the actual world – nature, that is, and man – were the result of an act of thought on the part of a creative mind, similar, it was supposed, in kind to the human mind. On this hypothesis it seemed competent for the human mind, even without the guidance of external experience, to think over again the thoughts of the Creator, and to rediscover them by its own inner activity.” Also see Helmholtz (1995 [1877a]), p. 314; (1867 [1856/66], III), p. 456.

⁶⁹⁵ Turner (1977), p. 57.

essential key to an in-depth understanding of his psychology of the object in general, and his emphasis on the constitutive role of agency in perception in particular.⁶⁹⁶

In order to grasp the systematic significance of Fichte's Ego-doctrine for Helmholtz's psychology, an analysis will be offered of the way in which the latter's philosophical work can be interpreted as a *metacritical* expansion and radicalization of Kant's transcendental theory of experience. The metacritical project was launched by Karl Leonard Reinhold – the first to hold the Jena chair in critical philosophy – and was motivated mainly by concerns about (i) critical philosophy's lack of a first foundational principle, and (ii) the dualism inhering Kant's system.⁶⁹⁷ Both problems, however, are interrelated, as the attempts to overcome Kant's dualism in post-Kantian philosophy proceeded mainly from the search for a single uniting principle, that should not only transcend Kant's doctrinal dualism, but also form the unitary foundational basis of the critical system. Fichte's project as well can be interpreted as a *metacritique* in this sense, to the extent that it aims to address both problems through an extensive elaboration of the notion of the self-reflexive I as the highest principle of knowledge, as the alpha and omega of the *Science of Knowledge* (see below).⁶⁹⁸

5.3 Fichte's *metacritique* of Experience

Because Fichte's project of a *metacritique* is closely related to his criticism of Kant's dualism, it is first of all important to gain insight into what the problem of Kant's dualism is, or may be, and how it relates to the central topic of our investigation, i.e. the problem of the object. As Zöllner has observed, Fichte's metacritical aspiration, i.e. the attempt to found Kant's critical project in an overarching principle, comes "under different guises", namely⁶⁹⁹

as the unity of intuition and concept in the first *Critique*, as the unity of moral fact and moral law in the second *Critique*, and as the unity of aesthetic feeling and knowing in the third *Critique*. Fichte's radical integration of (theoretical) understanding and sensibility, of (practical) reason and desire, and of (reflective)

⁶⁹⁶ Heidelberger (1993, 1994).

⁶⁹⁷ For a discussion of Reinhold's relation to Kant's philosophy, see for example Beiser (1987), Ameriks (2000) and Stevenson (2012).

⁶⁹⁸ Fichte (1982 [1794, 1797/98]).

⁶⁹⁹ Zöllner (2007), p. 252.

judgment and feeling aims at a deep structure of subjectivity that lends specificity and determinacy to what was left unspecified and indeterminable by Kant's triple *critique* of reason.

In short, the notion of '*metacritique*' is an overarching term for specific *metacriticisms* that have an equal amount of Kantian *dualisms* as their object. The term denotes Fichte's endeavor to found Kant's three *Critiques* individually, i.e. the latter's critical theories of knowledge, ethics and desire, as well as his overall attempt to articulate their mutual relation and unity, and as such, bring the critical project to its systematic completion.⁷⁰⁰ While we are especially interested in Fichte's *metacritique* of *experience* – i.e. those parts of his work that present a *critique* of Kant's first *Critique* – it will soon become clear that this dimension of Fichte's work is closely related to other aspects of his overall metacritical endeavor.

If we restrict ourselves to Fichte's *metacritique* of experience, the relevant dualism pertains to Kant's 'two stems of human cognition', i.e. sensibility and understanding, and their alleged 'common root' that Kant had intimated, but never articulated.⁷⁰¹ As was explained in the previous chapter, Kant's doctrine of synthesis analyzed experience as the synthetic product of both the passive (receptive) and spontaneous (active) faculties of the *Gemüth*. Upon abstraction, these two stems, as well as their synthetic unity in experience and knowledge, respectively express the two foundational characteristics of the critical project.⁷⁰² On the one hand, Kant's emphasis on the constitutive nature of subjective spontaneity is defining for his project as a *critique* of *immediacy*, i.e. Kant denies that *receptivity* alone suffices to bring about an object in experience, and by contrast, establishes the object as a function of subjectivity. On the other hand, however, subjective spontaneity is in turn claimed to be limited by the sensible material provided by sensibility. Hence, Kant writes, the finite mind "cannot become active except through being passive."⁷⁰³ In that sense, the defining feature of Kant's 'third way' approach between empiricism and rationalism is the way in which his work combines a *critique* of immediacy and an epistemology of constraint.⁷⁰⁴ Kant's

⁷⁰⁰ See for example Fichte (1982 [1794, 1797/98]), p. 46: "Kant [...] nowhere dealt with the foundation of all philosophy, but treated in the *Critique of Pure Reason* only of its theoretical aspect, [...]; and in the *Critique of Practical Reason*, only of its practical side."

⁷⁰¹ CPR [A15/B29].

⁷⁰² This analysis of Kant's project in terms of a *critique* of immediacy on the one hand, and an epistemology of constraint on the other, is based on Baur (2003).

⁷⁰³ Kant (1993 [1804]), p. 283. Also see Beiser (2002), p. 198.

⁷⁰⁴ Baur (2003). See CPR [A271/B327]: "Leibniz intellectualized the appearance, just as Locke totally sensitivized the concepts [...]. Instead of seeking two entirely different sources of representation in the

famous credo that “Thoughts without content are empty, intuitions without concepts are blind” seems to refer exactly to the way in which both stems of knowledge mutually determine and limit each other.⁷⁰⁵

As already suggested, however, Kant's doctrinal dualism was soon received as problematic. One of the bones of contention for post-Kantians pertained to the intelligibility of the idea of receptivity, and the way in which it relates to his *critique* of immediacy.⁷⁰⁶

According to the Kantian no object can count as an object for a human knower, apart from the knower's own activity or spontaneity [...]. [...] But [...] how is it possible to accept the Kantian *critique* of immediacy while also giving an epistemologically adequate account of the constrained or finite character of human knowing (i.e., an account that does not rely on some appeal to what is simply 'given')? [...] Many post-Kantian thinkers have accepted the Kantian *critique* of immediacy while at the same time rejecting Kant's account of such constraint. Some, in fact, have held that Kant's epistemology of constraint commits him to backtrack on his own *critique* of immediacy.

With regard to the question of experience and in light of Kant's criticism of immediacy, it was especially the idea of *passive affection* that was received as problematic. That is to say, given that there can be nothing in experience that is not a function of the subject, the mere notion of intuition was criticized as a dogmatic element of the critical system, i.e. as a premise that assumed the existence of objects, in a theory that exactly aimed to found the object and the process of objectification in subjective spontaneity.⁷⁰⁷ According to many, this was one of the aspects of Kant's philosophy that made it vulnerable to sceptical attacks, such as, for example, Schulze notoriously presented in his *Aenesidemus*.⁷⁰⁸ The latter criticized Kant's system exactly on this point, with the argument that the idea of a passive givenness presupposing the causal efficacy of a thing-in-itself is very hard to reconcile with the idea of a passive givenness at large, and that Kant's analysis of experience is unintelligible if one doesn't presuppose that moments of affection have a *Real-Grund*.⁷⁰⁹ This became a classic

understanding and the sensibility, which could judge about things with objective validity only in conjunction, each of these great men holds on only to one of them [...].”

⁷⁰⁵ CPR [A51/B75].

⁷⁰⁶ Baur (2003), p. 91-92.

⁷⁰⁷ See especially Schulze (1911 [1792]). Also see Ameriks (2000) and Wood (2000).

⁷⁰⁸ Schulze (1911 [1792]).

⁷⁰⁹ Schulze (1911 [1792]), p. 104.

problem for Kant scholars, and is commonly denoted as *the problem of affection*. The crux of the problem pertains to the epistemic status of ‘the object’ in, for example, the following quote: “The effect of an object on the capacity for representation, insofar as we are affected by it, is **sensation**.”⁷¹⁰ This passage in particular could invite interpretations in terms of noumenal causality, i.e. causal affection by the thing-in-itself, which would be inconsistent with Kant’s restriction of the applicability of the categories to the realm of possible experience.⁷¹¹

In reading Fichte’s 1797/98 *Versuch einer neuen Darstellung der Wissenschaftslehre*, one can hardly fail to notice the centrality of the problem of affection and of the question regarding the ground of passivity experience. However, Fichte explicitly rejects Schulze’s dogmatic, realistic reading of Kant.⁷¹² More particularly, Fichte firmly denies that the moment of affection in Kant is to be explained by referring to a causally affecting thing-in-itself, as this would, indeed, run counter to the Kantian prohibition to apply the categories beyond the realm of possible experience. “For me,” Fichte writes, “it is impossible to impute this absurdity to any still in possession of his reason”:⁷¹³

So long, therefore, as Kant does not expressly declare in so many words, that *he derives sensation from an impression given by the thing-in-itself*; or, to employ his own terminology, *that sensation is to be explained in philosophy from a transcendental object existing in itself outside us*; for so long I shall decline to believe what his expositors have to tell of him.

The basic mistake, according to Fichte, is that philosophers such as Schulze, for example, state that the idea of the thing-in-itself is grounded in sensation, and that

⁷¹⁰ CPR [A20/B34] (boldface in original). Also see Fichte (1982 [1794, 1797/98]), p. 58. Kant, however, was usually very careful in his formulations of the relation between cause and reality. See for example CPR [A168/B210]: “Thus every reality in the appearance has intensive magnitude, i.e., a degree. If one regards this reality as cause (whether of the sensation or of another reality in appearance, e.g., an alteration), then one calls the degree of reality as cause a ‘moment,’ e.g., the moment of gravity, because, indeed, the degree designates only that magnitude the apprehension of which is not successive but instantaneous.”

⁷¹¹ In this respect, also see chapter 4.

⁷¹² See for example Fichte (1982 [1794, 1797/98]), p. 54: “How broadly, then, according to Kant, does the applicability of all the categories extend, and in particular that of causality? Only over the realm of appearances; and thus only over what is already for us and in us. And how, then, could one arrive at the assumption of a something distinct from the self, as a ground of the empirical content of knowledge? [...] [O]ur expositors permit him for once to forget the basic contention of his system, as to the validity of the categories in general, and by a bold inference to issue forth from the world of appearances and arrive at things existing in themselves outside us. *Aenesidemus*, who, for his part, certainly also interprets Kant in this fashion [...] locates the truth of our knowledge in its conformity to things-in-themselves [...]”

⁷¹³ Fichte (1982 [1794, 1797/98]), p. 58.

hence, sensation itself is grounded in the thing-in-itself. Thus, he concludes, “[t]heir earth reposes on a mighty elephant, and the mighty elephant reposes on their earth.”⁷¹⁴

Yet, Fichte does admit that there are passages in the *Critique* that invite an interpretation in terms of this ‘absurdity’. In this context, Fichte refers especially to the ambiguous use of the term ‘object’ [Gegenstand] in *CPR* [A20/B34], as quoted above, and to *CPR* [A19/B33]: “The capacity (receptivity) to acquire representations through the way in which we are affected by objects is called sensibility.”⁷¹⁵ As Fichte likewise maintains that Kant cannot have meant that affection is founded in the thing-in-itself, he sets out to analyze the latter in terms of an act of spontaneity, thus accounting for the transcendental faculty of receptivity in terms of a subjective act of positing:⁷¹⁶

What, then, is the object? [...] The object affects us; *something that is merely thought* affects us. [...] What now is this? [...] If you posit an object with the thought that it has affected you, you conceive yourself *in this case affected* [...] [B]y this thinking of yours you ascribe to yourself receptivity or sensibility [...]. Is there then assumed to be no *contact*, no *affection* whatever in accounting for knowledge? [...] [C]ertainly, our knowledge all proceeds from an affection; but not affection by an *object*. [...] As surely as I posit myself, I posit myself as something restricted [...] This restrictedness of myself [...] is evinced in a limitation of my practical capacity [...]: the immediate perception of this limitation is a feeling.

The object that founds experience, in other words, is not the thing-in-itself, but the thing-for-me in its capacity of being posited through an operation of negation.⁷¹⁷ This is receptivity in Fichte, and this, in short, is how he resolves Kant’s concepts of intuition and understanding in one, single, transcendental act of positing and counterpositing.

Hence, if a *metacritique* of experience is needed at all, then, from a Fichtean perspective, it is meant to complete and improve the Kantian *critique* by critically analyzing the subjective ground of the passivity experience, or affection, and in doing so, strengthen the Kantian project against sceptical attacks. More particularly, Fichte sets out to demonstrate the way in which Kant’s *critique* of immediacy and his

⁷¹⁴ Fichte (1982 [1794, 1797/98]), p. 55.

⁷¹⁵ Fichte (1982 [1794, 1797/98]), p. 59.

⁷¹⁶ Fichte (1982 [1794, 1797/98]), p. 59-61. Also see Lumsden (2004), p. 124: “Fichte [...] was convinced by Maimon’s criticism of Kant [...]. On this reading of Kant, his reliance on a passively delivered intuitive content of knowledge left knowledge tied to an external and unknowable thing-in-itself. [...] Any first principle, which might secure the completion of the critical project, had to establish that knowledge was not given its content by a passively conceived model of intuition but that the subject was active in the determination of the intuitive component of knowledge as well.”

⁷¹⁷ Also see Fichte (2008 [1817]), p. 2: “[A]ffection itself is a limitation of the general sense to be affected in this particular manner. For instance: ‘I perceive this flower to be red’ means simply, that my seeing in general, and particularly my seeing of this colour, is limited by that particular seeing of a colour [...].”

epistemology of constraint can be united, by deriving the possibility of affection from the subject's spontaneity. As Baur explains, one could say that Fichte sought to found Kant's theory of constraint through a radicalization of the *critique* of immediacy, i.e. by turning passivity experience into a function of spontaneity.⁷¹⁸

The basic operator in this process is that of *negation*: affection – or the appearance of a Not-I in experience – denotes a moment of limitation, of constrained activity, and as such, should be thought of, and made intelligible against the background of the I's centrifugality. As was already noted, from this perspective, Fichte's system appears above all to be a philosophy of difference, i.e. an interrogation of the ground of differentiability in experience.

5.3.1 Fichte's Ego-Doctrine as a Philosophy of Difference

As the previous section has pointed out, Fichte's metacritical project – i.e. his attempt to found Kant's dualism between intuition and concept – was at least partially motivated by a concern for Kant's intuition in general, and his conception of affection in particular. All dogmatic suspicion with regard to the critical project, according to him, would disappear by resolving the notion of affection – or in Fichte's terminology “the feeling of necessity” – into spontaneity. In doing so, Fichte believed he was bringing the “fragments [Bruchstücke] and consequences” of Kant's critical philosophy to their necessary systematic completion, a completion that would not only render the latter intelligible and consistent, but furthermore transform transcendental philosophy into an airtight ‘System of Knowledge’, properly so called.

Fichte's metacritical project starts from Karl Leonard Reinhold's reading of Kant's system as a philosophy of consciousness. In his *Elementarphilosophie*, the latter set out to unify Kant's critical system by founding it on one single principle from which the critical distinctions could be derived.⁷¹⁹ In accordance with his peculiar phenomenological reading of Kant's first *Critique*, this endeavour amounted to an

⁷¹⁸ Baur (2003). Again, it should be noted that the search for a uniting principle in Fichte's philosophy, is closely connected with a criticism of Kantian intuition. See for example Fichte (1982 [1794, 1797/98]), p. 204: “[I]ntuition is an activity impossible without a passivity, and a passivity impossible without an activity.” This criticism of the status of affection or passivity in Kant's system goes hand in hand with a criticism of the Kantian thing-in-itself. In this respect, see for example Kuhn (1949), p. 553-554: “To him [the neo-Kantian] the object is the result of the ‘function’ of the logical process of objectivation; and the residuum which resists this ‘functionalization’ becomes an ‘objective’ [Aufgabe] – the infinitely distant goal for further act of logical determination. [...] All this goes beyond Kant in the sense that the transcendental synthetis is viewed as constituting not only ‘objects of experience’ but objects *tout court*.”

⁷¹⁹ Reinhold (2003 [1790]).

attempt to pinpoint the first, primitive fact of all possible states of consciousness. In Reinhold's theorizing, this 'fact' was defined as that of representation. All consciousness is first and foremost a state of representation. Hence, he put forward his *Satz des Bewusstseins* [the principle of consciousness] as the first principle of philosophy: "[I]n consciousness the subject distinguishes the representation from the subject and object and relates it to both [Im Bewusstsein wird die Vorstellung durch das Subjekt vom Subjekt und Objekt unterschieden und auf beide bezogen]."⁷²⁰ This principle, according to Reinhold, captures the unanalyzable basic fact of consciousness. In Pinkard's words, the principle captures the following primitive 'truth':⁷²¹

This otherwise indemonstrable fact of consciousness [...] constitutes the basic, ground-level complex [...] of all knowledge: a subject, an object, a representation of the object, and the subject ascribing the representation to itself as a subjective state of itself, while at the same time taking that subjective state of itself to be a representation of an object different from and independent of that state.

As this primitive fact expresses the synthetic unity of subject and object, according to Reinhold, it transcends Kant's two roots, and thus it could be accepted as the most fundamental principle of critical philosophy.

Although Fichte accepted "consciousness" as the ultimate principle (and problem) of philosophy, he was not convinced by Reinhold's argument for 'representation' as its first principle, for the simple reason that "if the subject were not able to relate itself to, and to distinguish itself from, the object and the state of representing, then it could not have a representation at all."⁷²² Reinhold's principle, according to Fichte, presupposes yet another, more fundamental feature of consciousness, namely the acts of relating and distinguishing, and raises the problem of the conditions of possibility for these activities. In other words, representational consciousness requires non-representational states of relating and distinguishing, which therefore should be treated as logically prior, in order to avoid problems of circularity or infinite regress, which emerge from the conflation of acts of representing and representational content (see chapters 3 and 4). From a Fichtean perspective, Reinhold's principle states the problem, not the solution.⁷²³

Fichte articulates the ultimate task of philosophy to be the determination of the (transcendental) ground of experience, defined as "the system of representations

⁷²⁰ Reinhold as quoted in Pinkard (2002), p. 99.

⁷²¹ Pinkard (2002), p. 100.

⁷²² Beiser (1987), p. 228. For Fichte's reception of Reinhold's philosophy, see especially Fichte's (1945 [1792]), *Aenesidemus Rezension*, and Breazeale's (1981) discussion of Fichte's review.

⁷²³ Fichte (1982 [1794, 1797/98]); Neuhausner (1990).

accompanied by the feeling of necessity.”⁷²⁴ His most basic point of departure is a *phenomenological* observation, i.e. from the very start, the philosopher accepts the feeling of necessity, or the fact that “I feel myself to be determined,” is “an immediate fact of consciousness [Tatsache].”⁷²⁵ Consequently, his transcendental analysis sets out to establish the transcendental ground of this phenomenological *fact*. As Fichte expresses it in 1817: What is it to say that “the thing is [das Ding ist]?”⁷²⁶ What is this feeling of necessity, once one denies that the feeling of affection is not caused by, nor grounded in the thing-in-itself?⁷²⁷ Or in other words: what is the ground of being for us, given that we should abstract of all thought of Being in itself?

Fichte furthermore argues that the Reinhold’s attempts to formulate the most basic principle have been in vain, because he was automatically, and mistakenly searching for a basic *fact* [Tatsache], while that what is at stake, is really a foundational act [Tathandlung], i.e. the act of relating and distinguishing. Hence, the fact of consciousness (relation and distinction) and this foundational act relate to each other as the grounded to the ground, and it is the philosopher’s task, Fichte adds, to derive the possibility of the former from the latter.⁷²⁸ The most basic fact to be explained, according to Fichte, is the following:⁷²⁹

I make a distinction within myself between a knowing subject and a real force [reelle Kraft], which, as such, does not know, but is [...] How do I come to make this distinction? How do I arrive at precisely this determination of what is being distinguished? [...] I do not know, without knowing *something*; [...] or [...] without separating something subjective in me from something objective. As soon as

⁷²⁴ Fichte (1982 [1794, 1797/98]), p. 6, 31. Also see Fichte (1992 [1796/99]), p. 98.

⁷²⁵ Fichte (1982 [1794, 1797/98]), p. 62. Fichte’s phenomenological point of departure is especially clear in the introduction to his 1817 *Facts of Consciousness* [Tatsachen des Bewusstseins] (p. 1), where he writes: “The essence of all science consists in this: that we proceed from something sensuously perceived to its supersensuous ground. It is precisely so with philosophy. Philosophy starts from the perception of knowledge through the inner sense and proceeds to its ground. In the present series of lectures we shall be busied with the first part of this science, with the phenomenon. It is this phenomenon which we propose systematically to observe [...]” For a recent analysis of Fichte’s relation to the phenomenological tradition, see Waibel et al. (2010).

⁷²⁶ Fichte (2008 [1817]), p. 12.

⁷²⁷ Fichte (1982 [1794, 1797/98]), p. 62.

⁷²⁸ Fichte (1982 [1794, 1797/98]), p. 42: “It is [...] not so trivial a matter as it seems to some, whether philosophy starts out from a fact or an Act (that is, from a pure activity which presupposes no object, but itself produces it, and in which the acting, therefore, immediately becomes the *deed*). If it proceeds from the fact, it places itself in a world of existence and finitude, and will find it difficult to discover a road from thence to the infinite and supersensible; if it sets out from the Act, it stands precisely at the point joining the two worlds, from whence they can be surveyed with a single glance.”

⁷²⁹ Fichte (2005 [1798]), p. 10-11.

consciousness is posited, this separation is posited; without the latter no consciousness whatsoever is possible. [...] Knowing and being are not separated outside consciousness, and independent of it; instead, they are separated only within consciousness, since this separation is a condition for the possibility of all consciousness [...].

The most fundamental question of Fichte's philosophy thus becomes that of *difference* - or the search for the transcendental ground of the phenomenological fact that "consciousness as a whole is informed by a dual structure" - and it is only by addressing the question of experience as a problem of difference and differentiation, that the central question of his philosophical project can be answered, i.e. : "How do we come to believe in an existent [ein Sein]? [...] How is an existent possible for us [Sein für uns]? [What is] the ground of the predicate of existence in general [...]?"⁷³⁰

In accordance with Fichte's understanding of the object as limitation, the question of consciousness *qua* differentiated consciousness can therefore be reformulated in terms of the possibility of representing *qua* determined [bestimmte] activity:⁷³¹

Now what does a determinate activity [bestimmte Tätigkeit] mean, and how does an activity become determinate or determined? Merely by having some resistance [Widerstand] posited in opposition to it - posited in opposition [entgegengesetzt]: that is to say, a resistance that is thought of by means of ideal activity and imagined to be standing over against the latter. Wherever and whenever you see activity, you necessarily see resistance as well, for otherwise you see no activity.

In conclusion, the question of the object, in Fichte's theorizing, takes the form of the question regarding the foundation of the phenomenological experience of necessity, determination, and limitation. As is clear from the above quote, the possibility of this experience, in Fichte's analysis, is made to depend on the *principle of resistance*. This principle, in turn, can only be made intelligible in reference to the principle of ideal activity. "A determined consciousness," Fichte writes, is at once "a determined freedom," and hence, the object as determination is produced from self-determination, i.e. the object is conceived of as a negative moment - a moment of limitation - in the subject's unbridled (ideal) activity. To say that 'the thing is', is at once to determine the self as limited to this being: "in every determined knowledge, there is a duplicity melted into a oneness: freedom, which makes it a knowledge, and a certain limitation, or canceling of this freedom, which makes it determined knowledge."⁷³² Fichte's

⁷³⁰ Neuhouser (1990), p. 79; Fichte (1982 [1794, 1797/98]), p. 31-32.

⁷³¹ Fichte (2005 [1798]), p. 12.

⁷³² Fichte (2008 [1817]), p. 10.

transformation of the question of the object into the question of the production of difference, thus automatically leads us to consider the core of his transcendental idealism, i.e. his doctrine of the self-positing subject.

5.3.2 Fichte and the Striving Subject

The Wissenschaftslehre calls upon every person to reflect upon what he does when he says 'I'.

- Fichte (1992 [1796/99]), p. 82.

In accordance with Fichte's conception of the object as limit, his analysis of experience assumes the I to be a principle of absolute activity, and a condition of possibility for object constitution. Fichte therefore establishes the self, not as a *fact* [Tatsache], but as an *act* [Tathandlung], as the first principle of transcendental philosophy: the I posits itself, absolutely and infinitely.⁷³³ It is only for an I thus conceived, that an object can be posited as a *Gegenstand* or resistance:⁷³⁴

Insofar [...] as an object is to be posited, and as a condition of possibility for such positing, there must be another activity (=X) occurring in the self, distinct from that positing.[...] The object is merely posited, insofar as there is resistance to an activity of the self; no such activity, no object. It is related as determinant to determinate. Only insofar as this activity is resisted, can an object be posited; and so far as it is not resisted, there is no object.

Hence, consciousness is constituted as a dual structure, through the reciprocal determination of I and Not-I, dialectically related to each other as reality and negation, and posited by the active self through the awareness of limitation or resistance.⁷³⁵ In short, the object as negation, in Fichte's theorizing, is grounded in the *striving* subject; it is only through this striving I, that a Not-I or 'check' [Anstoss] can arise.⁷³⁶ The concept of 'check' in Fichte's philosophy denotes the constitutive moment at which the infinite

⁷³³ Fichte (1982 [1794, 1797/98]).

⁷³⁴ Fichte (1982 [1794, 1797/98]), p. 228-229.

⁷³⁵ Fichte (1982 [1794, 1797/98]), p. 108: "How can A and ~A, being and nonbeing, reality and negation, be thought together [...]? They will mutually limit one another. [...] [T]he idea of a limit is an analytical concept, inherent in the combination of reality and negation [...]."

⁷³⁶ Fichte (1982 [1794, 1797/98]), p. 191.

activity or striving of the Ego encounters resistance, and the possibility of differentiation arises between the I and the Not-I.⁷³⁷

At this point it becomes clear why Neuhausser, among others, interpreted Fichte's system first and foremost as "as an attempt to construct a 'theory of subjectivity', or "an explanation of what it is to be an I."⁷³⁸ As already mentioned, Fichte's conception of the self-positing I can be read as an elaboration and expansion of Kant's pure apperception. That is to say, the *Tathandlung*, in which Fichte founds his entire philosophy, does not just denote the activity of the I, but more importantly, the *self-relating activity* of the I. At the very beginning of his project, Fichte takes up the question of the *I think* as a condition of possibility for representation:⁷³⁹

He [Kant] [...] says: "The supreme principle of the possibility of all intuition, in its relation to understanding, is that all the manifold of intuition should be subject to conditions of the original synthetic unity of apperception" [...] [F]or Kant [...] all consciousness, [...] stands under conditions of the original unity of apperception [...] [W]hat, then, is the condition of the original unity of apperception? [...] [T]hat it should be *possible* for my representation to be accompanied by the '*I think*', that is, that *I am what thinks* [Ich bin das Denkende] in this thinking. **Which 'I' is being spoken of here?**

And he continues:⁷⁴⁰

Hence, for Kant, the possibility of all consciousness will be conditioned by the possibility of the self, or of pure self-consciousness [...] [S]o for Kant, therefore, a systematic derivation of all consciousness, or what comes to the same, a system of philosophy, would have to set out from the pure self [...]. I am very well aware that Kant by no means *established* a system of the aforementioned kind [...] I am aware that **he by no means proved the categories he set up to be conditions of self-consciousness, but merely said that they were so** [...] However, I think I also know with equal certainty that Kant envisaged such a system; that everything that he actually propounds consists of fragments and consequences of such a system, and that his claims have sense and coherence only on this assumption.

⁷³⁷ See for example Fichte (1982 [1794, 1797/98]), p. 203: "The endlessly outreaching activity of the self, in which nothing can be distinguished [...] is subjected to a check; and its activity, though by no means to be extinguished thereby, is reflected, driven inwards; it takes exactly the reverse direction."

⁷³⁸ Neuhausser (1990). Also see for example Ameriks (2000), Frank (2004, 2007) and Stevenson (2012).

⁷³⁹ Fichte (1982 [1794, 1797/98]), p. 48 [boldface added]; CPR [B132].

⁷⁴⁰ Fichte (1982 [1794, 1797/98]), p. 50-51 [boldface added]. For Fichte's view on the fundamental incompleteness of Kant's system, also see Fichte (1992 [1796/99]), p. 80.

In other words, whereas Kant had assumed (or ‘postulated’) that pure apperception is a necessary condition of possibility for representation, Fichte, in his turn, aimed to determine the conditions of possibility for this implicit self-relation (or self-understanding) that necessarily accompanies all acts of representation. The ‘common root’ of both the object and the subject of consciousness, according to Fichte, lies exactly in the ideal structure of the I, that grasps itself *qua activity*.⁷⁴¹

I find myself to be acting efficaciously in the world of sense. All consciousness arises from this discovery. Without this consciousness of my own efficacy [Wirksamkeit], there is no self-consciousness; without self-consciousness, there is no consciousness of something else that is not supposed to be I myself.

Fichte thus conceptualized the I that accompanies all representation as a self-relating act of self-positing. This self-relating structure of primordial spontaneity is given, according to Fichte, through ‘intellectual intuition’:⁷⁴²

[T]he immediate consciousness; that I act [...]: it is that whereby I know something because I do it. [...] I can take no step, move a hand or foot, without an intellectual intuition of my self-consciousness in these acts; only so do I know that I do it, only so do I distinguish my action, and myself therein, from the object of action before me.

In other words, the intellectual intuition denotes the pre-reflective grasp which the subject has of itself as agentive, and, as such, it is a constitutive act of self-relation with respect to the possibility of consciousness. Hence, Fichte concludes:⁷⁴³

Intellectual intuition is the only firm standpoint for all philosophy. From thence we can explain everything that occurs in consciousness; and moreover, only from thence. Without self-consciousness there is no consciousness whatever [...] The concept of action, which becomes possible only through this intellectual intuition of the self-active self [selbsttätigen Ich], is the only concept which unites the two worlds that exist for us, the sensible and the intelligible.

⁷⁴¹ Fichte (2005 [1798]), p. 9.

⁷⁴² Fichte (1982 [1794, 1797/98]), p. 38.

⁷⁴³ Fichte (1982 [1794, 1797/98]), p. 41. Although the concept of an ‘intellectual intuition’ as denoting the self-relating activity of the I seems to align with Kant’s conception of subject = x as both a blind intuition and an empty thought, it should be noted that Kant explicitly rejected the notion of intellectual intuition as a mystic *Unding*, i.e. as non-sense. See for example Kant (1997 [1921]), p. 425: “[I]ntellectual intuition [...], i.e., the possibility that purely intellectual *a priori* concepts [...] rest on immediate intuition of the understanding; This mystical hypothesis thus assumed that the understanding could operate like the senses, having pure intuitions [...]; however the faculty of intuition, which rather applies to the senses alone, cannot be attributed to the understanding [...].”

In the concept of the intellectual intuition Kant's two stems of knowledge are united: the object (as negation) can only be made intelligible in reference to a subject that is given to itself *a priori* as activity, or through a nonrepresentational primordial act of self-positing.⁷⁴⁴ In Fichte's *Tathandlung*, matter and form, intuition and concept, are united in the grounding principle of the I's intuitive self-relating as the being of activity. This is what Henrich called Fichte's 'original insight': in order to account for object-consciousness, the correlative account of the subject should not proceed from a subject that discovers itself as object, but as pure act of spontaneity.⁷⁴⁵ Indeed, Fichte confirms: "From the moment we began the *Wissenschaftslehre*, we have been trying to characterize the I in terms of activity."⁷⁴⁶ Through Fichte's theorizing, Kant's subject = x is transformed into the primordial principle of the I as a spontaneous, self-relating activity. Furthermore, the interrogation of the 'I' mentioned by Kant, is not an inquiry merely in and for its own sake, but an attempt to define the subject that can be the subject of a being-for-us. More particularly, as the object is first and foremost thought of as resistance and limit, it is to be thought against the background of a subject that can encounter resistance, i.e. a knowingly agentive being. This is why Fichte's transcendental theory of experience has been commonly received as an account in which practical and theoretical philosophy are united, or, in Beck's wording, as "an extension of Kant's Transcendental Deduction from the *I think* to the *I will*."⁷⁴⁷ Through this extension, the subject-object opposition is resolved in the dynamical, reciprocal determination of the I and the Not-I. This, in turn, has consequences for Fichte's conception of spatial determination:⁷⁴⁸

Our striving, or our practical acting, is [...] the standard of measure for all spatial determination. [...] [A]ny determination of the place of things – and thus consciousness itself – is possible only in consequence of some real efficacy.

As such, the primacy of the *I will* over the *I know* transpires in the shift of the *a priori* from space itself to activity as a condition of possibility for external intuition.

In the end, Fichte's extension and transformation of the *I think* from a *Tatsache* to a *Tathandlung*, not only unites Kant's two stems of knowledge, but likewise blurs the boundaries between a theoretical and practical project of reason. Knowing and acting form the opposite angles from which the same fundamental structure (determined

⁷⁴⁴ Neuhouser (1990).

⁷⁴⁵ Henrich (1982 [1967]).

⁷⁴⁶ Fichte (1992 [1796/99]), p. 121.

⁷⁴⁷ Beck (1996).

⁷⁴⁸ Fichte (1992 [1796/99]), p. 72.

consciousness) is analyzed, and both unfold from the assumption of the self-relating I.⁷⁴⁹ As such, the attempt to found Kant's theory of cognition by taking the self-reflexivity of the I as a point of departure, amounts to a *System of Knowledge* in which "philosophy is pushed out of the theoretical field [...] over into the practical."⁷⁵⁰ Or as Fichte captures it in his *Vocation of Man*:⁷⁵¹

[I]t is [...] our own real activity and [...] the definite laws of human action which lies at the root of all our consciousness of a reality external to ourselves [...]. From this necessity of action proceeds the consciousness of the actual world; and not the reverse way [...] **We do not act because we know, but we know because we are called upon to act: the practical reason is the root of all reason.**

The possibility of the cognitive self (the self of the 'I know') is fully dependent on unconditioned self-affection, that is, on the immediate self-relating activity of the I's self-positing and the intellectual intuition of *I=activity*. Consequently, Fichte claims that freedom is not just a practical law [Praktisches Gesetz], but furthermore "a theoretical principle [Theoretisches Princip]" for the determination of our world [Weltbestimmung].⁷⁵² In the end, Fichte's metacritical project amounts to the adoption of Kant's moral subject – as analyzed in the *Critique of Practical Reason* – as the foundation of the transcendental theory of knowledge.⁷⁵³ This practical (or ethical) subject is the autonomous and free subject that founds the possibility of ethics:⁷⁵⁴

I assert that we must necessarily lend to every rational being that has a will also the idea of freedom, under which alone it would act. For in such a being we think a reason that is practical [...]. [W]e cannot prove this freedom as something actual [...] [W]e have to presuppose it if we would think of a being as rational and endowed with consciousness of its causality in regard to actions, i.e. with a will; thus we find that [...] we have to attribute to every being endowed with reason and will this quality, to determine itself to action under the idea of its freedom.

Fichte's metacritical analysis of the question of 'what can we know?' – i.e. the crux of Kant's first *Critique* – ultimately finds its answer in the *quid juris* investigation of the structure of practical subjectivity. Or, in other words, in Fichte's philosophical project,

⁷⁴⁹ For a discussion of the way in which Fichte's *metacritique* amounts to a unification of practical and theoretical reason, see for example Ameriks (2000), Wood (2000), Zöller (2000).

⁷⁵⁰ Fichte (1982 [1794, 1797/98]), p. 61.

⁷⁵¹ Fichte (1858 [1800]) [boldface added], p. 131.

⁷⁵² Fichte (2005 [1798]), p. 70.

⁷⁵³ See chapter 4.

⁷⁵⁴ Kant (2002 [1788]), p. 64-65.

the problem of *what the subject must be like to know*, is grounded in, and unified with, the question of *what the subject must be like to act*.

5.3.3 Fichte's Facts of Consciousness: The Phenomenology of Perception

Here then, [...] is the point to which the consciousness of all reality unites itself: the real efficiency of my conception, and the real power of action which [...] I am compelled to ascribe myself. [...] I conceive this, my real power of action, in thought, but I do not create it by thought. The immediate feeling of my impulse to independent activity lies at the foundation of this thought: the thought does no more than portray this feeling.

- Fichte (1858 [1800]), p. 116-117.

Fichte's posthumously published *Facts of Consciousness* [*Die Thatsachen des Bewusstseins*].⁷⁵⁵ is the only one of Fichte's works to which Helmholtz explicitly refers (see below). Furthermore, it is highly relevant to this discussion, as it can be read as an application of the *Science of Knowledge* to the specific problem of external perception. From this 1817 work, Fichte's position in the history of philosophy as one of the precursors of the phenomenological tradition becomes especially clear, and his concern with experience *qua* experience of a living, acting being, becomes very poignant.

The *Facts of Consciousness* is a transcription of Fichte's lectures at the university of Berlin in 1810 and 1811, which aimed to provide a comprehensible introduction to the complex matter of *The Science of Knowledge*.⁷⁵⁶

The essence of all science consists in this: that we proceed from something sensuously perceived to its supersensuous ground. [...] In the present series of lectures we shall be busied with the first part of this science, with the phenomenon. It is this phenomenon which we propose systematically to observe, and it will be my duty to guide your observation.

In accordance with Fichte's distinction between the *Tatsache* and the *Tathandlung*, related to each other as the grounded to the ground, we could thus say that his 1817 work presents the phenomenological argument that precedes and motivates his transcendental analysis of experience, and makes the latter intelligible.⁷⁵⁷ More

⁷⁵⁵ Fichte (2008 [1817]).

⁷⁵⁶ Fichte (2008 [1817]), p. 1.

⁷⁵⁷ Neuhaus (1990), p. 88.

interestingly, however, the work ‘hovers’ between the empirical and the transcendental, between actual experience and the transcendental analysis thereof.

Fichte’s work begins with an analysis of perception as a form of externalizing thought, in which thought is defined as “a positing [ein Setzen], and a positing in opposition [...] hence op-positing [ein Gegensatz].”⁷⁵⁸ To see an object, Fichte explains, is to say that “the positing of it is complete, and I am limited by this positedness.”⁷⁵⁹ In contrast to the quite abstract expositions of *The Science of Knowledge*, Fichte’s *Facts of Consciousness* examines the ground and structure of this process of op-positing, and the conditions in which its possibility is founded for an actual *living* being.

In empirical consciousness, one never finds absolute activity [Thätigkeit], but only determined activity or agency [Wirksamkeit], i.e., activity that is always already ‘checked’ by, and directed to, resistance.⁷⁶⁰ But what is agency? The centrifugal activity of the Ego, to the extent that *it is living* will meet resistance, and through resistance, “a tendency of the Ego to overcome that check,” i.e. the drive [Trieb], is posited.⁷⁶¹ This drive – defined as the “tendency to absolute self-activity” – that defines the Ego to the extent that it is part of the natural order, is thus called into being in and through resistance, which is first and foremost *felt* as “a force stronger than [...] life, opposing itself to life,” and “posited outside [...] as an independent being.”⁷⁶² The subject-object opposition (or more precisely the subject-object op-positing) thus manifests itself first and foremost in terms of a dynamical opposition between *forces*.⁷⁶³ The concept of drive

⁷⁵⁸ Fichte (2008 [1817]), p. 5-6, 13.

⁷⁵⁹ *Ibid.*, 42.

⁷⁶⁰ The difference between ideal pure activity and empirical consciousness is expressed by Fichte (2008 [1817], p. 42) in terms of intentionality, i.e. seeing is always seeing something, and to see is an activity defined by its determination through an object: “my seeing is no longer a pure seeing, but the seeing of a colour, as the further determination of pure seeing.” For the difference between *Thätigkeit* and *Wirksamkeit*, see Fichte (2005 [1798]).

⁷⁶¹ Fichte (2008 [1817]), p. 38: “Let us assume that such a causality of life through its immediate being is checked: what will then arise in the checked life? [...] I believe, an *impulse* [Trieb]. [...] [T]hrough the checking of the causality there arises in life an impulse.”

⁷⁶² Fichte (2005 [1798]), p. 46; Fichte (2008 [1817]), p. 39. Also see Fichte (2005 [1798]), p. 105-107: “I myself am [...] nature, [...]; and this nature of mind is a drive. [...] My nature, [...] insofar as it is supposed to consist in a drive, is thought of as determining itself through itself [...]. From the viewpoint of the ordinary understanding, however, the very existence of a drive is nothing more than a fact of consciousness, and ordinary understanding does not extend beyond the facts of consciousness. Only the transcendental philosopher goes beyond this fact, and he does so in order to specify the ground of this fact.”

⁷⁶³ Fichte (2008 [1817]), p. 44-45: “For surely that through which the thing really exists, and hence can alone enter into connection with us, and which therefore must surely constitute its essence, is its force or power; [...] this power, [...] were the real thing.” Also see Fichte (1992 [1796/99]), p. 76: “What is perceived [...] appears to us as a limitation of our physical force [...]. Accordingly, a physical force outside of us is posited as what determines this limitation.”

[Trieb] in Fichte's theorizing denotes the unity of striving and check that is the "actual condition" of the Ego.⁷⁶⁴ To the extent that the Ego is drive, however, it is a natural being, not an agent. The Ego is an agent only insofar as it is able to relate to itself as *possible* activity, i.e., to the extent that it can determine its actions in the material world in accordance with the *concept of an end*, or in other words, to the extent that it is *intentional*.⁷⁶⁵ The possibility for this conceptual self-determination, according to Fichte, transforms the drive-being into an agent.

This agentive being that is presupposed in (and founds the possibility of) perception, defined through the dynamics of striving and resistance, is, again, the self-determining subject of practical reason. At this point, Fichte's analysis once again leads us from the *facts* of consciousness to its primordial act. In the context of his phenomenological analysis, this is formulated as follows:⁷⁶⁶

The Ego must appear absolutely *a priori*. We do not learn by experience that we act [dass man wirke]; we have no perception of it as we have of our passive states. That causality [Wirksamkeit] of ours presupposes a free conception created through absolute self-activity. This conception, and our possible causality in accordance with it, are internally contemplated [innerlich angeschaut] [...] as a mere faculty [Vermögen], even in advance of the actual accomplishment of the intended causality; and it is already in this executed and completed prototype [Vorbild] of such a causality that the Ego appears necessarily as a material organ.

In other words, in experience, the self-reflexive structure of the Ego as an agent, which is required to posit resistance, is not given through or derived from physical action, but from the intuition of internal self-determination (also see section 5.4). As such, Fichte's phenomenology of perception is indeed rooted in, and intrinsically linked with what Martin calls Fichte's *transcendental phenomenology of agency*.⁷⁶⁷ If Fichte proceeds to inquire "[w]hat manifold is contained in this representation," he emphasizes that at least one crucial element of it cannot be objectified, i.e. the immediate intuition that "I myself am supposed to be the ultimate ground of the change that has occurred. [...] [T]he subject of consciousness and the principle of efficacy are

⁷⁶⁴ Fichte (2008 [1817]), p. 39.

⁷⁶⁵ Ibid., p. 40: "As soon as the impulse to have causality exists and continues, there arises in consciousness a desire to form the just described conception of a possible causality to produce a certain end [...]. Through what is this forming of such a conception conditioned? I maintain that, [...], it is conditioned [...] by an image of the checking power, or resistance; for if the conception of that possible causality is to arise in the mind [...] the resistance must be taken hold of by the mind, [...] until it is found that a certain direction of the faculty will necessarily conquer the resistance."

⁷⁶⁶ Ibid., p. 49.

⁷⁶⁷ Martin (2006).

one.”⁷⁶⁸ ‘The principle of efficacy’ is the ability to say that *I* act, and it is not derived from, but precedes actual physical action. This is at once what defines the subject in Fichte’s metacritical analysis of experience.⁷⁶⁹ In his *Vocation of Man*, Fichte adds that the conceptual determination of action, which is given in sensible experience as the feeling of a “real power of action,” is the subjective ingredient of action that makes the objective part – the action itself – determinable. Without it, “my action must appear to me as entirely without meaning, as a mere delusive picture.”⁷⁷⁰

5.4 Interludium: From the Pure Ego to the Articulated *Leib*

There is one final notion of Fichte’s metacritical theory of experience that calls for further consideration, namely the notion of the body. Although Fichte’s transcendental theory of subjectivity has become commonplace, the way in which this Ego-doctrine correlates with a philosophy of the human body remains underappreciated.⁷⁷¹ Fichte’s interest in the body as a constitutive dimension of experience is most apparent in his *Wissenschaftlehre Nova Methodo* (1796/99), the *Grundlage des Naturrechts* (1796/97), and *Das System der Sittenlehre* (1798). In those works, the focal point of his philosophical reflections shifts from the *ideality* of the pure Ego, to the reciprocal determination of the I and the Not-I in *actual* experience. In accordance with this shift, the body comes to the forefront as the instrument by means of which “the will of the person enters the realm

⁷⁶⁸ Fichte (2005 [1798]), p. 9.

⁷⁶⁹ Fichte (2005 [1798], p.5) defines the principle of efficacy as follows: “I find myself to be acting efficaciously in the world of sense [Ich finde mich, als wirkend in der Sinnenwelt]. All consciousness arises from this discovery.” Also see Fichte (1858 [1800]), p. 117-118: “I feel within me an impulse and an effort towards outward activity [...]. Since this I itself is the last point at which I feel this impulse, therefore it certainly appears to me as an impulse founded in myself, to an activity founded in myself. Might it not be however that this impulse, although unperceived by me, is in reality the impulse of a foreign power invisible to me, and that notion of independence merely a delusion, arising from my sphere of vision being limited to myself alone? I have no reason to assume this, but just as little reason to deny it. [...]. Do I then indeed feel that real power of free action, which, strangely enough, I ascribe to myself without knowing anything of it? By no means; - it is merely the determinable element, which, by the well-known laws of thought whereby all capacities and all powers arise, we are compelled to add in imagination to the determinate element – the real action, which itself is, in like manner, only an assumption.”

⁷⁷⁰ Fichte (1858 [1800]), p. 117-119.

⁷⁷¹ For an extensive discussion of Fichte’s theory of subjectivity, see Neuhouser (1990).

of the sensible world.”⁷⁷² In other words, the human body emerges in Fichte's philosophy as the necessary *tertium quid* between ideal subjectivity and the material conditions of experience. As López-Domínguez noted, the Fichtean body constitutes the “link between theory and practice” and “the necessary place for the constitution of the I and the consciousness.”⁷⁷³ Hence, this discussion would be fundamentally incomplete if we were to ignore this dimension of Fichte's thought.

If one takes the perspective of actual experience, Fichte explains, a consideration of the body – the material vehicle of the Ego – is needed first and foremost to found the intelligibility of the concept of *resistance*:⁷⁷⁴

[T]hat which offers resistance is matter, and the purpose is to separate this matter, get it out of its place, or remove it. But matter can be moved out of its place in space only through other matter; and thus it appears that the Ego [...] must itself be matter, [...] an [...] in-space-limited body [im Raume begränzter Körper].

The necessity of the body as a material thing [Körper], is thus deduced from the transcendental analysis of experience: the dynamical constitution of the object *qua* resistance presupposes a physical, material *body* as a condition of possibility.

However, the passage above also mentions the concepts of *purposiveness* and *motion*. As we explained in the preceding sections, the idea of ‘resistance’ in Fichte's theory of objectification, only becomes intelligible against the background of voluntary, purposive activity. Therefore, Fichte's body must be more than a material presence, and should be accounted for first and foremost in its capacity as an instrument of voluntary action, and as an expression of striving subjectivity. In addressing the question concerning the necessary constitution of the *acting* body, Fichte introduces two

⁷⁷² Fichte (2000 [1796/97]), p. 103-104: “The will of the person enters the realm of the sensible world only insofar as it is expressed in a determination of his body. [...] The body is the I's representative in the sensible world, and where only the sensible world is being considered, it is the I itself.”

⁷⁷³ López-Domínguez (2010), p. 196. Also see Fichte (1992 [1796/99]), p. 164: “Critical idealism is neither materialism nor dogmatism. It is not materialism, which begins with things; nor is it the sort of idealism that begins with mental substance; nor is it dualism, which begins with the mind and the thing in itself, considered as two separate substances. Instead, Critical idealism [...] begins with their reciprocal interaction [...]. Nothing in the *Wissenschaftslehre* is more crucial than this interaction of the I and the Not-I [...]. The I is intuited only in reciprocal interaction with the Not-I. It can be thought of apart from this relationship, but then it is not actual, but is a necessary Idea.”

⁷⁷⁴ Fichte (2008 [1817]), p. 48 [boldface added].

principles of comprehensibility, or two levels of transcendental analysis, namely that of *organization* on the one hand, and of *articulation* on the other.⁷⁷⁵

[O]nly what is [...] in space can be united with or related to something spatial [...]. But what is in space and fills space is matter. As a product of nature, therefore, I am matter; more precisely [...] I am organized matter [Organisierte Materie] that constitutes a determinate whole: I am *my body*. [...] Moreover [...] my body must be movable in many different ways. Such a constitution of the body is called *articulation* [Artikulation]. If I am to be free, then my body must be articulated.

While the concept of organization founds the comprehensibility of the body as a moving organism, the concept of articulation transforms the organic body into a human body, i.e. an instrument of will, and the means for self-determined (or *free*) action. Through the power of self-determination, the body is transformed from an organism into an articulated structure. Hence, Fichte's metacritical analysis of the structure of subjectivity and his transcendental determination of the primacy of the *Tathandlung* in experience, are actualized in the concept of the articulated body. On the one hand, thinking the subject as free, necessitates a concept of the body as capable of self-determined, voluntary action. On the other hand, the foundational experience of the *I act* is anchored in a pre-reflective awareness of the body as a sphere of willful articulation.

Bodily articulation, thus conceived, is the foundation of differential awareness of subject and object in experience, given that this awareness is first constituted in accordance to the scheme of will and resistance: "[T]o say that an activity is restricted means that a certain determination of [...] [the] articulated body has been rendered impossible."⁷⁷⁶ Hence, the articulated body is a constitutive dimension of experience.⁷⁷⁷

[T]his determination of the body's articulation is [...] produced by the will's efficacy, and [...] it is canceled by an influence from outside. [...] If the person did not posit that it is at least possible for him to reproduce, through his mere will, the given determination of his body's articulation [...] he could not at all ascribe his body to himself or posit that there has been an influence upon himself.

Furthermore, the possibility of experience is not just founded in a conception of the subject as an embodied activity, but more importantly, in the subject's primitive bodily self-awareness as a "subject-object", i.e. an articulated structure.⁷⁷⁸ Therefore, Fichte

⁷⁷⁵ Fichte (2008 [1798]), p. 122.

⁷⁷⁶ Fichte (2000 [1796/97]), p. 59.

⁷⁷⁷ *Ibid.*, p. 60.

⁷⁷⁸ Fichte (2008 [1798]), p. 124.

defines *willing* as an “inner efficacy, an act of affecting oneself” or as an “intelligible feeling.”⁷⁷⁹ He adds that this ‘finding’ or ‘positing’ of oneself as an articulated body, is first and foremost an act of *inner* determination, that precedes and founds all acts of object-determination. The body is active, insofar “as *I* am active through it”, if not, “[m]y body [...] would have to exercise some efficacy [...] without me exercising my efficacy through it.”⁷⁸⁰ In other words: without this inner determination, the body would be moving, but not genuinely acting, as the latter requires an act of self-determination. Hence, Fichte concludes, “my own efficacy,” and with that, my bodily articulation, is “not present for me through my outer organ,” but through my “inner one.”⁷⁸¹ This internal feeling of the body as an instrument of the will, i.e., as articulated, is therefore posited as the condition of possibility for object consciousness.⁷⁸²

[E]verything I perceive, all objects, are nothing more than something that hinders my own [...] efficacy; but **only if my efficacy is present for me can I know that something is hindering it.** [...] How do I know what is canceled [by the present object]? [...] This certainly does not lie within my consciousness [of the external object]. Consequently, **the very efficacy that is hindered must, at the same time, be [...] present for me.**

The way in which this efficacy or the “practical power” is present for the subject through the inner organ, Fichte adds, is by means of an ideal prefiguration or model [Vorbild] of the concept of a goal.⁷⁸³ Fichte contrasts this *Vorbild*, that represents our practical power in actual experience, as given through the ‘inner organ’, with the *Nachbilder* [copies] of external actions, as received through the ‘outer organ’.⁷⁸⁴

Fichte’s transcendental analysis of experience thus amounts to the assumption of a necessary duplicity on the level of the body and bodily self-awareness.⁷⁸⁵ On the one hand, the body is *a mere thing*, a dimension of sense-perception, and as such, its constitutive conditions coincide with the ones determining the possibility of object-

⁷⁷⁹ Fichte (1992 [1796/99]), p. 264.

⁷⁸⁰ Fichte (2000 [1796/97]), p. 70.

⁷⁸¹ Fichte (1992 [1796/99]), p. 327.

⁷⁸² Fichte (1992 [1796/99]), p. 327 [boldface added].

⁷⁸³ Fichte (1992 [1796/99]), p. 149-150: “My I, considered as the subject of my practical power [...] must therefore always construct for itself in advance the concept of this goal. It requires, as it were, a ‘model’ [Vorbild] the realization of which is the goal of the real activity.”

⁷⁸⁴ Fichte (1992 [1796/99]).

⁷⁸⁵ Also see Fichte (1992 [1796/99]), p. 333: “[T]he I is already something twofold. [...] The I [...] is both subject and object. We [...] wish to relate to each other these two aspects of the I [...].”

consciousness. On the other hand, the body is experienced as a source of self-determination, and an articulated structure.⁷⁸⁶

The body we have deduced is necessarily articulated, and must be posited as such. A material body [Körper] [...] whose permanence and identity we tie to the permanence and identity of our own personality – a body we posit as a closed, articulated whole, and which we posit ourselves as a cause that acts immediately through our will – is what we call our human body [Leib] [...].

The foundational experience of the body as *Leib* precedes and founds its self-identification as *Körper*. It is only by virtue of its articulation, that “the body become[s] an object of perception.”⁷⁸⁷ Thus, Fichte concludes, “the outer organ proceeds from a higher, inner one.”⁷⁸⁸

But what it to say that the Ego is a moving and acting physical structure? “Have I now, then, completely externalized [entäussert] the Ego, and placed it [...] into the region of external perception?” Fichte wonders. “Yes and no,” he answers.⁷⁸⁹

The bodily presentation of the Ego and its causality in the material world are externalized; but the self-determining [Selbstbestimmung] of this causality [Wirksamkeit], the conception and plan [Vorbild] that precede it, remain as yet mere objects of internal contemplation [innern Anschauung], and in so far the Ego has not [...] been externalized. But that causality [Wirksamkeit], as the external, is conditioned by that self-determining, or by that conception, as the internal, and without an internal we shall never get an external.

Hence, Fichte’s expansion and radicalization of the idea of transcendental apperception along the lines of practical subjectivity (the *I act*) finds its terminus in, and is actualized by, the *articulated body*. The *I act* that should be able to accompany all representations, has now become the immediate ‘intelligible feeling’ of one’s own embodied subjectivity, i.e. the immediate consciousness of the act as an articulation of the will.

⁷⁸⁶ Fichte (2000 [1796/97]), p. 58.

⁷⁸⁷ *Ibid.*, p. 330.

⁷⁸⁸ *Ibid.*, p. 339: “[T]he outer organ proceeds from a higher, inner one, Here again we have an opportunity to observe the difference between the manner in which the idealist operates and that of the dogmatists. The dogmatic philosopher explains everything from the outside in: he proceeds toward the inside, {from the periphery to the center}. The transcendental idealist [begins at the center and] describes the radii leading towards the periphery. {He shows that we explain everything from the inside, that} everything comes from within; it is of no use to presuppose external things [...].”

⁷⁸⁹ *Ibid.*, p. 54.

One can hardly fail to notice the way in which Fichte's insistence on the necessary duplicity of the body as a material *Körper* on the one hand, and an articulated *Leib* on the other, anticipates later phenomenological analyses of perceptual experience. As is well known, it is exactly this distinction that was to become central in Edmund Husserl's and Merleau-Ponty's phenomenological projects.⁷⁹⁰ Consider for example the following passage from Husserl's *Ideas II*.⁷⁹¹

[The] Body [Leib] [...] is an organ of the will, the one and only Object which, for the will of my pure Ego, is moveable immediately and spontaneously [...] Only Bodies [Leiber] are immediately spontaneously ("freely") moveable, and they are so, specifically, by means of the free Ego and its will [...]. It is in virtue of these free acts that [...] there can be constituted for this Ego [...] an Object-world, a world of spatial-corporeal [raum-körperlicher] things (the Body as thing [das Ding Leib] included). [...] The Ego has the "faculty" (the "I can" ["Ich kann"]) to freely move this Body -i.e. the organ in which it [i.e. the I can] is articulated [in die er sich gliedert] - and to perceive an external world by means of it.

In this passage, the body is established as a constitutive condition for objectification, and more particularly, the body in its dual presence as 'apprehended' body-object, and 'apperceived' body-subject, or as a material presence, and an intentional structure. Similar to Fichte, Husserl distinguished between the subject-body [Leib], as *internally* articulated through the *I can*, and the material object-body [Körper].⁷⁹² More particularly, he considered the body to be as much a physical thing, as "a field of free movement."⁷⁹³ This duplicity furthermore constitutes one of the most basic dimensions of experience.⁷⁹⁴ The phenomenological *Leib* or subject-body is the referential axis from which the possibility of objectification unfolds. That is to say, things *are*, according to Husserl, to the extent that they are able to relate to a perceiver's voluntary acts. He gives the following example:⁷⁹⁵

⁷⁹⁰ For an extensive analysis of the way in which Fichte's Ego-doctrine resonates with the core tenets of the phenomenological tradition, see In Waibel et al. (2010).

⁷⁹¹ Husserl (1989 [1952]), p. 159.

⁷⁹² Also see Husserl (1960 [1950]), p. 97.

⁷⁹³ Husserl (1989 [1952]), p. 330.

⁷⁹⁴ Also see for example Husserl (1989 [1952]), p. 168: "If we now try [...] to characterize the way a body is constituted for the [...] subject, then we find that: 1) viewed from 'within' - in the 'inner attitude' - it appears as a freely moving organ (or system of such organs) by means of which the subject experiences the external world [...], 2) Approached from the outside - in the 'outer attitude' - it presents itself as a reality sui generis. That is: [...] as a material thing [...]."

⁷⁹⁵ Husserl (1907) as quoted in Pachoud (1999), p. 207.

With a visual field that remains unchanged, things can appear both in movement and at rest. This shows us that purely visual indications do not suffice for apprehension, that they are not capable of differentiating between immobile and mobile appearances. This implies that the constitution of the objective place and of objective spatiality is essentially mediated by the movement of the body [...]

As Husserl expresses it elsewhere: the body [Leib] is a constitutive dimension of perceptual experience because it “has, for its particular Ego, the unique distinction of bearing in itself the zero point of all [...] orientations.” And the body fulfills this role only to the extent that it is conceptualized not just as a thing, but more importantly, as the seat of voluntary action. In a similar vein, Merleau-Ponty described the body as the sphere of ‘potential movement’ and ‘the power of action’, and emphasized that this “plunge into action is [...] an original way of relating [...] to the object.”⁷⁹⁶

Although it is tempting to further investigate the parallels between Fichte’s articulated body and the phenomenological *Leib*, this would be beyond the scope of this dissertation. It suffices to point out that Fichte’s articulated body, and the phenomenological *Leib* occupy the same systematic place in the theory of objectification. More than being an inert *thing*, the body is conceptualized as an expression of purposive subjectivity, and as such, it is the ‘zero point’ of experience.⁷⁹⁷ This elucidation of the embodied dimension of Fichte’s theory of subjectivity could not only instrumental in attenuating the common reception of his work as presenting an abstract, disembodied view of the subject, it could also form a valuable intermediate level between the idealist theory of subjectivity and the third level of analysis in Helmholtz’s psychophysiology of perception, that is discussed in the following sections.

5.5 Helmholtz and Fichte? Possible Objections

Since the publication of Helmholtz’s work, scholars have pointed to the important ways in which it resonates with Fichte’s Ego-doctrine (see below). Notwithstanding the strong textual and systematic evidence in favor of this hypothesis, most of these interpretations remain fragmentary and vague, with comments on the matter being

⁷⁹⁶ Merleau-Ponty (1962 [1945]), p. 125, 127.

⁷⁹⁷ See for example Merleau-Ponty (1962 [1945]), p. 202-232.

restricted to no more than a few tentative statements.⁷⁹⁸ At least two obvious reasons for this state of affairs come to mind, namely the apparent opposition between (1) scientific psychology and post-Kantian idealism on the one hand, and (2) Helmholtz's anti-metaphysical stance and Fichte's metaphysics of the Absolute Ego on the other.

5.5.1 Scientific Psychology and Post-Kantian Idealism

First of all, the conceptual intertwinement of subjectivity and freedom in post-Kantian idealism in general, and in Fichte's work in particular, may seem to thwart its compatibility with a scientific psychology from the very start. That is, at least, to the extent that the latter is defined as a methodologically naturalistic project of the mind, in which mental phenomena are treated *as if* they were natural phenomena and *as if* they were susceptible to theoretical decomposition into basic indivisibles and reconstruction based on general laws (see chapter 3). Idealist subjectivity and scientific psychology, in this sense, would stand over and against each other as freedom and determinism respectively. In the same vein, Fichte's philosophy could also be considered to be inherently anti-psychologistic, i.e. a theory of subjectivity that is the complete opposite of the scientific viewpoint, understood in the restricted, deterministic sense.⁷⁹⁹ In the past decades, it has become quite common to oppose scientific objectivity and idealist subjectivity in exactly this sense.⁸⁰⁰

⁷⁹⁸ As will be discussed below, an important exception in this respect is Heidelberger's (1993, 1994) work.

⁷⁹⁹ See for example Robinson (1986), p. 348: "For Fichte, [...] the very freedom of the human will, in contrast to the deterministic character of purely physical processes, settled once and for all the question of a scientific psychology: there could be none. If there is to be a psychology, it must be a deductive, philosophical discipline that accepts as its subject the will and intentions of the Self (Ego)." In this respect, also see Klempe (2012).

⁸⁰⁰ In this respect, see for example Daston and Galison's (2007, p. 36-37) analysis of the concept of objectivity: "First and foremost, objectivity is the suppression of some aspect of the self. [...] [T]he emergence of objectivity must tally with the emergence of a certain kind of wilful self, one perceived as endangering scientific knowledge." The opposition to the post-Kantian notion of subjectivity plays a pivotal role in Daston's and Galison's philosophical narrative about the emergence of the modern concept of objectivity. In their work, early psychology in general and Helmholtz's theory in particular are interpreted against the background of this quite dramatic struggle for objectivity, in the face of the danger of the subject. Despite the merits of Daston and Galison's work – and their analysis of objectivity as correlative with notions of subjectivity – they paint a rather one-sided picture of Helmholtz's philosophical stance and of the philosophical embeddedness of early psychology (see for example Hallet, 2009). For one thing, Helmholtz's theory of space is explained as being fundamentally opposed to Kant's, with no appreciation of the general transcendental spirit of it, as discussed in the previous chapter, and recently demonstrated by Neuber (2012). Furthermore, Daston and Galison (2007) do not seem to appreciate the idealist elements in Helmholtz's psychological thought, nor in Wundt's. Notwithstanding the fact that Wundt (e.g., 1897 [1896]) denoted his own psychological theory as *voluntarism* – as it assigned a pivotal role to volitional processes in mental life – an overly simplified reading of his work as presenting mere structuralism, is, however, not uncommon (for a

The alleged mutual exclusiveness of early scientific psychology and post-Kantian idealism is, however, heavily flawed, and seems to be symptomatic for the empiricist bias of psychology's historical self-understanding, which has been pointed out by Robinson, for example.⁸⁰¹

[I]t is not uncommon to find histories of psychology uncritically accepting the thing contemporary psychologists happen to be engaged in and, from these ventures, working back in time to discover their precedents. Such datings are often of use [...], but as historical contributions they are incomplete and misleading.

From this selective and partial historical self-understanding, it follows, according to the latter, that⁸⁰²

[t]he aspiring psychologist might be expected to know something about "Mill's methods" and [...] the general features of Darwinian biology and the sensory-physiological theories of Helmholtz. But no one is asked any longer to pour over the works of Bain and Spencer, Fichte or Schelling, Kant or Hegel.

In the past decades, however, a number of authors have attempted to overcome this strikingly selective and partial reconstruction of the history of psychology, by pointing out the continuity between early German psychology and post-Kantian idealism.⁸⁰³

In the present exposition these efforts are extended through an analysis of the way in which Helmholtz's theory of the experiment, and its pivotal role in his psychology of the object, is rooted in an internalistic understanding of agency, which resonates in important ways with Fichte's Ego-doctrine as presented in the previous sections. As such, this challenges the idea of a mutual exclusivity of psychology as a science and the post-Kantian subject, as it is shown that Helmholtz's theorizing resists naturalistic reductionism from the very beginning. This is because his psychology of the object is founded crucially in the assumption of a free subject, i.e. a subject that is neither reducible to, nor can be inserted in, the causally determined chain of natural events.

discussion see for example Rieber & Robinson, 2001). Unfortunately, this reading also erases all traces of the post-Kantian dynamical idea of the self that transpires from his work (Blumenthal, 1980; Robinson, 1986; Van Hoorn & Verhave, 1980; Erneling & Johnson, 2005).

⁸⁰¹ Robinson (1986), p. 3.

⁸⁰² Robinson (1986), p. 395.

⁸⁰³ See for example Blumenthal (1980), Leary (1980), Robinson (1986), Van Hoorn & Verhave (1980), Erneling & Johnson (2005).

5.5.2 Helmholtz's Anti-Metaphysical Stance and Fichte's Absolute Ego

A more compelling argument against our analysis, however, could be that Helmholtz's anti-metaphysical attitude is seemingly irreconcilable with the quite robust metaphysical and speculative character of post-Kantian philosophy in general, and Fichte's system in particular. As already mentioned in section 5.2, however, the hypothesis endorsed in the subsequent analysis is that of a restricted indebtedness in Turner's (1977) sense, i.e. the continuity of Helmholtz's theorizing with Fichte's is affirmed, but only to the extent that the latter is read not so much as a metaphysician, but rather as a philosopher of mind. While Helmholtz's quite robust anti-metaphysical stance might be very hard to reconcile with Fichte's Absolute and infinitely striving Ego, he quite clearly appreciated Fichte's Ego-doctrine insofar as it presented an adequate analysis of passivity experience in perception in terms of the dynamical scheme of activity and resistance, constituted by the finite, living being. As such, one could say that Helmholtz transformed Fichte's 'most basic insight' from a metaphysical presupposition into a necessary normative component of the psychology of objectification in general, and the psychology of differentiation in particular.

However, before we go on to explore the systematic relevance of Fichte's *metacritique* for Helmholtz's psychology, an overview will be given of primary and secondary sources that support the main hypothesis of this chapter, i.e. that Helmholtz's 'intellectual leap' in the context of his theory of perception is not only a leap to a critical level of analysis, but also to what we have called the metacritical perspective.

5.6 Helmholtz's Fichte: In the Beginning was the Act

For some of the most valuable clues regarding Helmholtz's appreciation of J. G. Fichte's work, his lifelong correspondence with his father Ferdinand forms an excellent starting point.⁸⁰⁴ As noted in the introduction, Ferdinand Helmholtz was a close friend of Immanuel Hermann Fichte (J.G. Fichte's son), who was the younger Helmholtz's godfather and namesake.⁸⁰⁵ In the letters to his father, Helmholtz describes his everyday life and his academic achievements and activities, and he engages in extraordinarily

⁸⁰⁴ For Helmholtz's letters to his parents, see Koenigsberger (1902/03); Cahan (1993b).

⁸⁰⁵ Koenigsberger (1902/03).

interesting discussions on the philosophical purport of his work on sense perception. One of these correspondences is especially relevant to this analysis, namely the letters written in the aftermath of Helmholtz's 1855 lecture *Über das Sehen des Menschen*.⁸⁰⁶ In this lecture Helmholtz sketches the general outlines of his theory of perception, and he describes "Fichte, the grand thinker" as follows: "however drastic and strange he opposes the common world view, he does [...] not contradict the natural sciences, but [...] is in complete accord with [...] the results [...] of sense physiology."⁸⁰⁷ In a letter to his father Helmholtz reiterates this claim:⁸⁰⁸

Last Tuesday [...] I gave another lecture upon Human Vision on occasion of the Kant memorial [...] in which I tried to put forward the correspondence between the empirical facts of sense physiology and the philosophical attitude of Kant, and also of Fichte, although I was somewhat hindered in my philosophical exposition by the need of making it popular.

In an earlier letter to Ferdinand (written in September 1852), the young Helmholtz even went so far as to claim that his theory perception can be read as "an empirical statement of Fichte's fundamental views of sense-perception."⁸⁰⁹ Although Helmholtz, given the strong anti-metaphysical climate of his time, may not have been too keen on openly expressing his sympathy towards (certain aspects) of Fichtean philosophy, these letters provide a quite compelling argument in favor of a consideration of Helmholtz's theorizing in light of Fichte's philosophy.⁸¹⁰ In later work also, however, Helmholtz approvingly refers to the philosopher's work in the context of his theory of perception.⁸¹¹

Especially when reading Helmholtz's theory of the experiment – which will be discussed in detail below – one is easily reminded of the basic tenets of Fichte's Ego-doctrine. More particularly, Helmholtz accounts for the problem of differentiation in a manner that resonates in important respects with Fichte's philosophy, and even articulated certain elements of his theory of perception in a Fichtean terminology. Consequently, the latter's philosophical system provides a relevant background for the

⁸⁰⁶ Helmholtz (1896 [1855]). Around the same time their correspondence concerning Schopenhauer's accusation of plagiarism, as discussed in the previous chapter, took place.

⁸⁰⁷ Helmholtz (1896 [1855]), p. 89 [my translation].

⁸⁰⁸ Letter from Helmholtz (1855) as quoted in Koenigsberger (1902/03), p. 242 [my translation].

⁸⁰⁹ Letter from Helmholtz (September 1852) as quoted in Koenigsberger (1902/1903), p. 169 [my translation].

⁸¹⁰ Schulz (2004).

⁸¹¹ See especially Helmholtz (1995 [1878b]), p. 351; Helmholtz (1896), p. 592.

interpretation of what Heidelberger called Helmholtz's *experimental interactionism*. "From Fichte," Heidelberger writes⁸¹²

[...] Helmholtz appropriated the view that our consciousness comes to shape its conception of the outer world through the limitations we experience in our practical actions. Only by actively interfering with the world of external objects can we interpret our sensations as due to external causes and thereby distinguish them from the free acts of thinking inside our consciousness.

Notwithstanding the strong evidence in favor of a Fichtean strand in Helmholtz's theorizing, however, this peculiar indebtedness has been mostly neglected, or treated as a peripheral element of the latter's work.⁸¹³ In the previous section, I have suggested two possible explanations for the minimal scholarly attention that has been given to the Fichtean dimension in Helmholtz's work. To this we might add that it remains unclear what exactly Helmholtz had read of Fichte. In a 1841 letter to his godfather Immanuel Hermann Fichte, the young Helmholtz – a student in medicine at that time – states that he has "recently studied some works of your great father [ihres Grossen Vaters]," but unfortunately, he does not specify which works exactly he had studied.⁸¹⁴ From a footnote in the second, revised version of his *Treatise*, it is clear that Helmholtz had been impressed by Fichte's 1817 *Facts of Consciousness*, about which he writes that it contains "correct and sharp [Richtige, scharf ausgesprochen] insights" on the nature of sense perception.⁸¹⁵ Furthermore, it is reasonable to assume, as Turner does for example, that Helmholtz must have had some degree of familiarity with the *Science of Knowledge*. Helmholtz's available writings and correspondence do not, however, provide decisive evidence on that matter.⁸¹⁶

Among those who have granted a certain significance to the Fichtean dimension in Helmholtz's work, opinions differ with regard to the precise manner in which it should be interpreted, without doing violence to Helmholtz's anti-metaphysical stance. Schiemann (2009), for example, suggested that there might be some way in which Helmholtz's theory resonates with the Ego-doctrine, but only to the extent that Fichte's work "reveals pragmatic aspects that Helmholtz felt were important for explaining life's everyday mechanism of perception and achievements in scientific experimental

⁸¹² Heidelberger (1993), p. 463.

⁸¹³ Boring (1950, p. 311), for example, even stated that "Helmholtz took his stand [...] against the reigning German philosophy of Kant and Fichte" and treats Helmholtz's psychology as a strict empiricist theory.

⁸¹⁴ Unpublished letter from Helmholtz to Immanuel Hermann Fichte, January 2nd, 1841. Württembergische Landesbibliothek, Stuttgart, Cod.Hist.4° 593, I.e., Nr. 197.

⁸¹⁵ Helmholtz (1896), p. 248 [my translation].

⁸¹⁶ Turner (1977).

action.”⁸¹⁷ In contrast to Schiemann (2009), who puts the whole matter forward as an altogether rather trivial one, Meulders feels that Fichte’s shadow (together with that of Kant), is ‘omnipresent’ in Helmholtz work, “because both philosophers were at the very roots of his [i.e. Helmholtz’s] own concept of perception.”⁸¹⁸ However, Meulders does not further elaborate on this point. This aligns with Cassirer’s earlier statement that Helmholtz had not only been “deeply impressed” by Fichte, but furthermore had “assimilated [...] the latter’s theory of the I and the Not-I.”⁸¹⁹ These suggested interpretations of the Helmholtz-Fichte relationship, however, remain fragmentary and vague, with comments on the matter being restricted to no more than a few tentative statements, made in the context of discussions pertaining to other aspects of Helmholtz’s work.

The only author to have presented extensive analyses of the Helmholtz-Fichte relation is Heidelberger, who convincingly argued that the failure of taking this indebtedness into account has led to a considerable misunderstanding of the scientist’s overall philosophical position.⁸²⁰ More particularly, he claims that the “inner core of Helmholtz’s philosophy [...] had its roots in Fichte’s philosophy,” and therefore maintains that “the essential key to understanding Helmholtz’s philosophy of science lies in appreciating the influence of Fichte’s idealism.”⁸²¹

In contrast to Heidelberger, however, who maintained that Helmholtz “proceeded from a metaphysical position in his philosophy of science,” the subsequent sections suspend the metaphysical question in favor of a restricted analysis of the Helmholtz-Fichte relation which is more in line with Turner’s 1977 suggestion on the matter (see section 5.2).⁸²² Furthermore, in what follows, the focal point is not Helmholtz’s philosophy of science, but the systematic place of the Fichtean ‘moment’ in Helmholtz’s psychological approach to the problem of perceptual experience. In accordance with the psychological angle taken in this analysis, the main focus will be on the way in which Helmholtz’s appealed to Fichte in the context of his attempt to address the problem of differentiation. It should be noted, however, that Helmholtz’s view on the constitutive role of experimentation unifies his epistemological and psychological stance, as he states for example that⁸²³

⁸¹⁷ Schiemann (2009), p. 70.

⁸¹⁸ Meulders (2010), p. 106.

⁸¹⁹ Cassirer (1969 [1950]), p. 3. Also see Turner (1997), Schultz (2004).

⁸²⁰ See Heidelberger (1993, 1994) especially.

⁸²¹ Heidelberger (1993), p. 494.

⁸²² Heidelberger (1994), p. 168 [my translation].

⁸²³ Helmholtz (1867 [1856/1866], III), p. 452 [my translation].

[t]he same great significance which experiment has for the certainty of our scientific convictions it has also for the unconscious inductions of our sense perceptions. It is only by voluntarily bringing our organs of sense in various relations to the objects, that we learn to be sure as to our judgments of the causes of our sensations.

In what follows, a systematic analysis of the constitutive role of agency in Helmholtz's theory of perception, as well as the way in which it resonates with Fichte's Ego-doctrine, is presented. This investigation subsequently goes into the philosophical purport (section 5.6.1) and the physiological structure (section 5.6.2) of agency in Helmholtz's theory.

5.6.1 Helmholtz's Philosophy of Agency

As was explained in the previous chapter, a determining factor for understanding Helmholtz's idiosyncratic appropriation of Kant's conception of the causal law, and his revision of Kant's theory of space, is the scientist's emphasis on the necessary mediating role of voluntary movement. To say that something is the cause of sensations, and to understand the spatial meaning of sign-sensations, presupposes a differentiating act, or an *Ur-teilung*. As such, the experiment, for Helmholtz, is not just a scientific technique, but a generalized epistemological strategy, as McDonald argues; or with Heidelberger: an *ars inveniendi*, rather than an *ars demonstrandi*.⁸²⁴ "Efforts [...] to establish belief in external reality, [...]" Helmholtz maintains, "must remain unsuccessful so long as they proceed only from passive observation." And he goes on to explain that⁸²⁵

[...] human actions, [...] posited by the will, form an indispensable part of our sources of knowledge. We have seen that our sense impressions are only a sign language [...]. [...] We humans must first learn to understand this sign system, and that happens when we [...] learn to distinguish which changes in our sense impressions follow from our acts of will, and which others enter independently of will.

"The separation of thought and reality," Helmholtz writes elsewhere "first becomes possible, if we know how to distinguish between that which the I can and cannot change."⁸²⁶ As such, the perceptual process is founded in the dynamics of *activity* and *check* that Fichte had presupposed at the origin of perceptual consciousness. But there is

⁸²⁴ McDonald (2003); Heidelberger (1993).

⁸²⁵ Helmholtz (1995 [1892]), p. 410.

⁸²⁶ Helmholtz (1896), p. 592-594.

more to this story than just this rather superficial similarity. If one focuses on the philosophical presuppositions underlying Helmholtz's theory of the experiment, and especially on the irreducibility of his concept of voluntary action, Helmholtz's indebtedness to Fichte becomes especially tangible. This irreducibility in Helmholtz's theory of the experiment is manifested in at least three different ways, i.e., in (i) the irreducibility of volition to natural, deterministic causality, (ii) the irreducibility of the will's impulse to physiological processes, and (iii) the irreducibility of the self-reflexive structure of the voluntary act to a quasi-perceptual, *a posteriori*, self-determination.

5.6.1.1 Agency and Deterministic Causality

If we say that Helmholtz's conception of the role of causality in perception is mediated by his theory of the experiment, this means that the determination of the causal origin of a sensation emerges from the acknowledgment of an opposition between two generically distinct kinds of forces, i.e., natural, deterministic force, and the force of will. "In the experiment," Helmholtz writes, "the causal chain runs throughout our self-consciousness." The possibility of making sense of this 'chain' in terms of external events, however, depends on the fact that "we know one member of these causes – our will's impulse – from inner intuition, and know the motive by which it has occurred."⁸²⁷ A necessary presupposition with regard to this dynamic, Helmholtz adds, is that "our will's impulse has neither already been influenced by physical causes, which simultaneously determine the physical process, nor itself psychically influenced the succeeding perceptions."⁸²⁸ Or, as Helmholtz writes elsewhere, "we conceive of self-conscious acts of volition and thought as free."⁸²⁹ In his *Treatise*, this essential presupposition is articulated as follows:⁸³⁰

[B]y the evidence of our own consciousness, we assume [...] a principle of free will, for which we claim [...] a complete independence of the stern law of causality. [...] The case of conduct [handeln], that is best [...] known to us, we consider as an exception to the law.

As in Fichte's metacritical project, we once again see how the autonomous subject of Kant's second *Critique* emerges as the ultimate ground of knowledge and experience (see section 5.3). This free subject is defined negatively by Kant as that being which is

⁸²⁷ Helmholtz (1995 [1878b]), p. 358.

⁸²⁸ Helmholtz (1995 [1878b]), p. 358-359.

⁸²⁹ Helmholtz (1896 [1855]), p. 116 [my translation]; for the centrality of the assumption of free will in Helmholtz's theorizing, also see Heidelberger (1994, 2005).

⁸³⁰ Helmholtz (1867 [1856/1866], III), p. 454 [my translation].

independent of natural causality.⁸³¹ Volition, in Helmholtz's theorizing, is a self-subsistent, inner determinant of action, that functions as a condition of possibility for perceptual *Ur-teilung* between the I and the Not-I, and as such, its autonomy is a theoretical principle for "the determination of our world."⁸³²

It is in this assumption of a *free subject* as the basis of experience and knowledge, that the spirit of post-Kantian idealism transpires most tangibly in Helmholtz's psychology of the object. In the latter, the assumption of freedom, however, functions not so much as a metaphysical, but rather as a transcendental presupposition. Helmholtz has absolutely nothing to say on the essence of free will, or what its metaphysical status is in the world. The principle of freedom is neither derived from, nor produced by experience, but has the status of a principle of intelligibility, i.e. it is a normative claim with regard to the subject of perception and *how it has to be thought* in order to make sense of its ability to objectify. The perceptual process qua causal attribution and *Ur-teilung* presupposes the possibility of self-determined action.

As already noted (see chapter 3, section 3.6.2), this is the point where Helmholtz's psychological project diverges drastically from the one proposed by Mill. In the sixth book of his *A System of Logic*, the latter claimed that the possibility of a science of man crucially hinges on the assumption that the mind is causally determined, and that hence, this assumption justifies what we have called methodological naturalism in chapter 3:⁸³³

At the threshold of this inquiry, we are met by an objection, which, if not removed, would be fatal to the attempt to treat human conduct as a subject of science. Are the actions of human beings, like all other natural events, subject to invariable law? Does that constancy of causation, which is the foundation of every scientific theory of successive phenomena, really obtain among them? [...] The affirmative opinion is commonly called the doctrine of Necessity [...]. The negative maintains that the will is not determined, like other phenomena, by antecedents, but determines itself; that our volitions are not [...] the effects of causes [...]. I have already made it sufficiently apparent that the former of these opinions is what I consider the true one.

⁸³¹ See for example Kant (2002 [1785]), p. 63: "The *will* is a species of causality of living beings, insofar as they are rational, and freedom would be that quality of this causality by which it can be effective independently of alien causes determining it; just as natural necessity is the quality of all beings lacking reason, of beings determined to activity through the influence of alien causes." Also see Kant (2002 [1788]); 1991 [1797]), p. 42; CPR [A532/B560].

⁸³² Fichte (2005 [1798]), p. 70.

⁸³³ Mill (1882 [1843]), p. 581.

Helmholtz's position in this respect could not be more different from Mill's: while the latter maintains that the science of man would be impossible under the assumption of the freedom of will, the former establishes autonomous action determination as one of its most essential presuppositions. The determination of the lawlike (the realm of the Actual) presupposes autonomy (the realm of the I) and their mutual interaction and reciprocal determination. Hence, in Helmholtz's theory, *heteronomous* action determination would prevent the foundational act of differentiation, and as such, render experience utterly unintelligible. It is true, Helmholtz writes, that "in ascribing to ourselves free-will we deny *in toto* the possibility of referring at least one of the ways in which our mental activity expresses itself to a rigorous law."⁸³⁴ In contrast to Mill, however, this autonomy of the subject is a principle of intelligibility, and as such, it does not oppose, but rather founds the idea of a science of mind.

5.6.1.2 The Will's Impulse as a Mental Act

In addition to the irreducibility of agency to natural causality, Helmholtz's stresses that "the will's impulse is a mental act [psychischer Act]."⁸³⁵ As such, agency is not (entirely) reducible to physiological processes and structures, but is defined primarily in reference to intentions and motives, i.e., mental states and events. Or in Fichte's terminology: through mental preconfigurations [Vorbilder] of a *goal*. This dissociation of the mental and the physical dimension of agency allows one to conceive of volition as the principle of articulation of bodily movement, which has a degree of autonomy vis-à-vis its physical manifestations. The significance of this second irreducibility of agency in Helmholtz will be further explained in the following section, in the context of Helmholtz's physiological theory of agency.

5.6.1.3 Acting and Moving: The Primacy of the Act

The third crucial irreducibility of Helmholtz's conception of agency pertains to its self-reflexive structure. "The impulse to movement," Helmholtz claims, "is something directly perceivable. We feel **that** we do something [...] we do not know directly **what** we do."⁸³⁶ In psychological terms, this self-relation is directly experienced as *effort* [Willensanstrengung], a concept that at once expresses the self-reflexive structure of the act, and the unity of will and resistance.⁸³⁷ Helmholtz's claim regarding the

⁸³⁴ Helmholtz (1995 [1862]), p. 85.

⁸³⁵ Helmholtz (1995 [1878b]), p. 359; Helmholtz (1896), p. 594.

⁸³⁶ Helmholtz (1995 [1878b]), p. 348 [boldface added].

⁸³⁷ Helmholtz (1867 [1856/1866], III), p. 599.

immediate nature of the feeling *that* we do something – and the mediated awareness of the physical content, or result of our action – implies that the subject relates directly to itself in its effort, and hence, that this self-relation is not derived from the observation of movement, nor from the feeling of muscle contraction.⁸³⁸ By emphasizing the direct nature of the self-reflexive structure of the act, Helmholtz's theory maintains that actions are known by the subject "otherwise than by their effect," as Jeannerod put it, i.e. that the feeling of activity or spontaneity is generated centrally.⁸³⁹ While the perceptual process in Helmholtz's theorizing can be understood as a continuous positing, a co-determination of activity and passivity experience, this differentiating activity presupposes a primordial sense of authorship and ownership of actions.⁸⁴⁰ As such, the self-reflexive form of the act (*that* we do something) or the pre-reflective sense of self as an agency, logically and necessarily precedes physical movement (*what* we do). Hence, the possibility of perceptual consciousness, in Helmholtz's theory, is fundamentally dependent on the Fichtean idea of "the acting I's ability to experience itself immediately in its productivity [sich in seiner Produktivität erfahrenkönnende handelnden Ich]," as Schulz expresses it.⁸⁴¹

By stressing the immediate nature of the self-relation that defines the subject of the act, Helmholtz furthermore avoids the circularity of so-called objectal accounts of the I, like we have encountered throughout this dissertation.⁸⁴² Hence, the *I = activity* – or in Kantian terms, the *I think* that has to be able to accompany all representations – has a logical primacy over actual execution and objectal self-identification through observation. In other words, the *I = activity* cannot be derived from passivity experience, as this would leave a perceiver with nothing but 'optical phantasmagoria'.⁸⁴³

If the objects would simply be passed before our eyes by some foreign force [...] we would never have found our way in [...] such an optical phantasmagoria [...]. Through [...] experimentation [...] some of the changes in the sense-impressions are found to be dependent upon our own will; whereas others [...] are urged upon us with a necessity, that we cannot alter as we like [...]. Thus we come to acknowledge something independent of our will and imagination, that is, an external cause of our sensations.

⁸³⁸ Helmholtz (1867 [1856/1866], III), Jeannerod (1979, 2006), Scheerer (1989). Also see the next section.

⁸³⁹ Jeannerod (1979), p. 241.

⁸⁴⁰ Also see Heidelberger (1994), p. 171 [my translation]: "Helmholtz's account presupposes first, that the actuality of self-consciousness is immediately given and accessible to the agent [dem Handelnden], and second, that the will of the agent is free, and that he [the agent] is furthermore conscious of this freedom."

⁸⁴¹ Schulz (2004), p. 49.

⁸⁴² See chapters 3 and 4; Frank (2007).

⁸⁴³ Helmholtz (1925 [1856/66], p. 31-32; 1867 [1856/1866], III, p. 452). Also see Jeannerod (1979).

The primacy of experimentation thus comes down to the primacy of the will, and more importantly, the possibility to relate to our acts by virtue of the direct awareness of willed movement or *bodily articulation*, which determines the possibility of an indirect awareness of necessity or negativity. As was explained in the previous chapter, the logical primacy of the will in Helmholtz's theorizing is shown in his displacement of the transcendental element in the nature of space. He transforms the condition of space as an *a priori* form into the possibility of the will's impulse, which is the corporeal and mental ability for voluntary action – or the ability to say I act, even before the actual execution of movement – that founds spatial measurement and spatial differentiation.⁸⁴⁴ This part of Helmholtz's theorizing resonates with Fichte's insistence on the logical apriority of the Ego, i.e. his insistence that “[w]e do not learn by experience that we act [dass man wirke],” but that the ‘intellectual intuition’ – defined as the “immediate consciousness that I act” – precedes and grounds experience, which is defined at its most basic level by acts of differentiation.⁸⁴⁵

In conclusion, this triple irreducibility of the will's impulse in Helmholtz's theory of the object, tallies with the central tenets of Fichte's system of experience. The programmatic similarity with the Ego-doctrine is clear in Helmholtz treatment of differential consciousness as (i) constructed according to the general scheme of volition (or striving) versus resistance (or check), (ii) which is in turn dependent on the *a priori* assumption of an essentially free and active (or agentive) subject, which (iii) has a pre-reflective grasp of its agency through a centrally generated self-relation of the form I = activity. If we take a more general perspective, however, Helmholtz's theory of the experiment incorporates all elements of Fichte's metacritical project, as discussed above.

On the one hand, Helmholtz's theory of the experiment can be read as a further elaboration of Kant's *I think* as the highest principle of knowledge, albeit that this *I think* is transformed into the *I will*, and hence, specifies this primordial self-relation in terms of *practical* subjectivity. In the end, Helmholtz's psychology of the object is founded in the irreducible volitional subject, which functions as the ultimate ground of the appearance of the object as negation, external cause, and spatial object. The psychological answer to the Faustian question of *what was there in the beginning*, ultimately leads to a philosophical and physiological consideration of the structure of voluntary action as the quintessential axis from which experience and knowledge unfold. As such, Helmholtz's psychology incorporates the most general characteristic of

⁸⁴⁴ Also see Heidelberger (1993, 1994, 2005).

⁸⁴⁵ Fichte (2005 [1798]), p. 49; Fichte (1982 [1794, 1797/98]), p. 38.

Fichte's *metacritique*, i.e. the insertion of "the practical into the theoretical, in order to explain the latter in terms of the former."⁸⁴⁶ From this perspective, one can understand why Lenoir claims that Helmholtz's psychology contains a "gesture towards Kant's practical philosophy."⁸⁴⁷ The possibility of cognition and experience is founded in the autonomous subject, the subject of Kant's second *Critique*, and the zero point of Fichte's metacritical analysis.

On the other hand, this extension and transformation of Kant's highest principle at once eradicates the strict opposition between intuition and concept, as it did in Fichte's *metacritique*. By analyzing passivity experience, i.e. the moment of affection, in terms of an *Ur-teilung*, Helmholtz dissolves the concept of intuition in that of understanding. To say that an object is given, is to have determined it as independent of our self-determination as agents. "Fichte's appropriate expression for it is that a Non-ego forces recognitions of itself vis-à-vis the Ego."⁸⁴⁸ The Fichtean dimension in Helmholtz's psychology, in this sense, throws an interesting new light on Helmholtz's appropriation of Kant's analysis of experience, as the idiosyncrasies of this adoption can be made intelligible by placing them against the background of what we have called the 'metacritical perspective' in this chapter. On the one hand, Helmholtz considers the causal structure of understanding to be the *a priori* form of understanding, but in order to realize its function, the law in turn presupposes the differentiation between inner and outer causes that is dependent on the theory of the experiment.⁸⁴⁹ On the other hand, we have discussed the way in which Helmholtz's theory of space finally amounts to a displacement of the *a priori* which can similarly be found in Fichte, i.e. from space as an *a priori* form, to the striving subject as the ultimate ground of opposition between the spatial and the non-spatial. In short, the Fichtean dimension in Helmholtz's thought not only refers to particular elements of his theory of perception, but also to the peculiar manner in which both attempt to overcome the Kantian 'skandalon' of duality, i.e. through an identification of the 'common root' of intuition and concept with the *I think*, and an interpretation of the latter in terms of the primacy of the practical. Hence, it is no exaggeration to say that Fichte's Ego-doctrine indeed provides "the essential key," not only to understanding Helmholtz's philosophy of science, as Heidelberger has suggested, but to his psychological analysis of the object as well.⁸⁵⁰

⁸⁴⁶ Fichte (1992 [1796/99]), p. 86.

⁸⁴⁷ Lenoir (1993), p. 125.

⁸⁴⁸ Helmholtz (1995 [1878b]), p. 351.

⁸⁴⁹ In this respect, also see Turner (1977).

⁸⁵⁰ Heidelberger (1993), p. 494.

So much for the explicitly philosophical dimension of Helmholtz's *experimental interactionism*. In the following section, we will address the question of how much remains of this practical, *a priori* self-relating subject in Helmholtz's physiological theory, or, more precisely, how this view of subjectivity is translated, and transpires in his physiological account of the structure of voluntary action.

5.6.2 Helmholtz's Physiology of Agency

Helmholtz's account of agency was not strictly philosophical, but correlated with a thorough concern for the physiological architecture of voluntary movement. As in Fichte's theorizing however, Helmholtz's body is as much a physiological structure, as it is an expression of practical subjectivity.

In his *Treatise*, Helmholtz presents a physiological account of agency, hypothesizing that every voluntary act is represented on the level of sensibility as a complex of three sensations, which, when taken together, constitute what he calls the "muscular feeling" [Muskelgefühl]:⁸⁵¹

This term includes, [...] several different sensations that have to be distinguished [...]:

1. The intensity of the effort of will [Intensität unserer Willensanstrengung], whereby we attempt to set the muscles in action
2. The tension [Spannung] of the muscles [...]
3. The result of the effort, which [...] makes itself felt in the muscle, by an actual contraction [...]

In this physiological operationalization, the distinctive feature of Helmholtz's conceptualization of agency becomes clear when he distinguishes between the first sensation, and the others.⁸⁵² While the last two sensations denote afferent (or centripetal) physiological markers for agency, the first sensation is a centrifugal, efferent signal, which precedes the action as such. Indeed, one could say, it is the feeling of effort, that transforms organized movement, into articulated action, in the Fichtean sense (see section 5.4). By including the *Willensanstrengung* in the compound sensation of *Muskelgefühl* – thereby introducing the irreducible concept of the 'will' in his physiological theory – Helmholtz's theory denies that the self-reflexive structure of the act is entirely reducible to sensory feedback (as given in the latter two sensations), but that it instead requires a central (feedforward) signal that precedes the sensory cues

⁸⁵¹ Helmholtz (1867 [1856/1866], III), p. 599 [my translation].

⁸⁵² Jeannerod (1979).

related to actual movement. Simply put, an agent relates to itself as an agent, primarily through his identification with the intention, rather than the movement itself. As such, the *Willensanstrengung* is generically different from the other two sensations that are comprised in the term 'muscular feeling'. Although Helmholtz calls the awareness of the effort of will a sensation, it is not *sensed* in the same way as the two afferent signals, i.e. it is not produced by, but precedes actual muscular contraction and physical movement. In his physiological theory, it is especially this concept of *Willensanstrengung* that reveals a certain continuity of Helmholtz's thought with philosophical voluntarism, and it earned the scientist credit as one of the last physiologists to have "a place for the will in his theory of perception."⁸⁵³

Given that the concept of 'will' is primarily psychological and philosophical, within Helmholtz's physiological theory it functions as a hypothesis that cannot be positively demonstrated on a factual basis. However, Helmholtz attempts to demonstrate the theoretical pertinence of the will's impulse as an independent dimension of voluntary action, by means of counterfactual evidence gathered through his experimental practice.⁸⁵⁴ One of his most significant observations in this respect, are the perceptual phenomena experienced by subjects suffering from a partial or total paralysis of the eye muscles, in which the complex of muscular feeling is reduced to the sensation of the effort of will:⁸⁵⁵

[W]hen the external rectus of the right eye is paralyzed, or the nerve leading to it, this eye can no longer be moved to the right. [...] [T]he moment he [the patient] tries to move his eye [...] to the right, it no longer obeys his will [seinem Willen], but remains standing in the middle, while the objects appear to move to the right.[...] In the case of a paralyzed muscle, the effort of will [Willensanstrengung] is not followed by a movement of the eye, nor by a contraction of the muscles [...] The act of will [der Willensact] has no effect whatsoever beyond the nervous system; and yet our judgment as to the direction of the visual axis is formed as if the will [der Wille] had produced its normal effects; we believe that [...] the visual axis has moved to the right.

Helmholtz also describes the opposite case: if the eye is moved to the right by some external force, an illusory perception of motion is experienced. In this latter case, the shifting retinal image cannot be related to an effort of will, and hence, is externalized, although no actual movement is taking place.⁸⁵⁶ These observations, Helmholtz argues,

⁸⁵³ Scheerer (1989), p. 43. Also see Jones (1972) and Smith (2011).

⁸⁵⁴ See especially Helmholtz (1867 [1856/1866], III), § 29.

⁸⁵⁵ Helmholtz (1925 [1856/66], III, p. 245; 1867 [1856/1866], III, p. 600).

⁸⁵⁶ Helmholtz (1867 [1856/1866], III), p. 599.

demonstrate that the self-reflexive structure of the act – i.e., the ability to relate to a movement as being voluntary or involuntary – is only in the second place dependent upon sensory cues. To be more precise, they point to the constitutive role of *intentions* or *internal articulation* – described in terms of the efferent sensation of *Willensanstrengung* – in object perception on the one hand, and to the physiological irreducibility of voluntary movement to muscle contraction on the other. “These phenomena,” Helmholtz therefore concludes, “demonstrate beyond doubt that our judgment as to the direction of the visual axis, is a result of the effort of will [Willensanstrengung], by means of which we endeavor to adjust the position of the eyes.”⁸⁵⁷

As explained in chapter 4 (section 4.6), Helmholtz conceived of the problem of perception as constituting a borderland [Grenzgebiet] between the exact sciences and philosophy. This view seemed to be based on a sort of cartesian mind-body dualism: whereas philosophy, according to Helmholtz, isolates that which belongs to the mind in the perceptual process, the natural sciences are interested in the physical, ‘objectal’ causes of sense perception. At this point, however, the problem at stake has shifted from a mind-body problem, to what is now known as the ‘body-body’ problem within phenomenological literature, i.e. “the problem of how to relate one’s subjectively lived body to the [...] living body that one is.”⁸⁵⁸ Or in other words: the problem of how to relate the pre-reflective, unmediated sense of bodily articulation, to the mediated representation of oneself as a moving body. The realm of the body has now become the sphere of an original and constitutive duplicity between material presence, and original striving. As we discussed in this section, this duplicity is expressed in Helmholtz’s physiological analysis of the voluntary act by means of the distinction between centrifugal (central) and centripetal (peripheral) markers of self-generated action awareness. More particularly, the concept of ‘Willensanstrengung’ can be interpreted as an attempt to integrate the articulated subject-body into the physiological architecture of voluntary action. As such, it could be argued that Helmholtz’s psychophysiology contains an irreducible element of ideality. It is exactly this element, however, that would be scrutinized by philosophers after Helmholtz.

⁸⁵⁷ Helmholtz (1867 [1856/1866], III), p. 601 [my translation].

⁸⁵⁸ Thompson (2005), p. 408. Also see Thompson (2007), p. 244-252.

5.6.3 After Helmholtz: The Two Williams Debate

Helmholtz's non-reductionist view of voluntary movement was later adopted by Wilhelm Wundt.⁸⁵⁹ That is to say, Wundt also believed activity (and not receptivity) was the “ground-layer of consciousness”, and hypothesized an irreducible sense of agency founded all experience and knowledge.⁸⁶⁰ Therefore he explicitly called his psychology a *voluntaristic* psychology, as it starts out from the assumption that activity and volition constitute the most the most primitive and foundational level of our mental life.⁸⁶¹ Because of his emphasis on the constitutive role of the active ego, Wundt's theorizing has also been considered as continuous with the post-Kantian metatheoretical view of subjectivity, as sketched in this chapter.⁸⁶²

Wundt's views of subjectivity and the architecture of agency, are reflected first and foremost in his autogenetic theory agency, in which it is stated that⁸⁶³

[E]very act of will is the necessary sequence of an internal volition, and [...] in this latter, which, as a change in consciousness resulting immediately from affective motives, bears the stamp of self-activity, the essential features of volition are involved. [...] [W]e shall call that inner activity which bears the stamp of spontaneity *apperception*.

As such, Wundt considered the pre-reflective, internal ‘feeling of activity’ [Tätigkeitsgefühl] to be a defining feature of voluntary action (as distinguished from ‘impulsive’ acts) and one of the central building blocks of what he called the *Ego*.⁸⁶⁴

⁸⁵⁹ See Wundt (1897 [1896]).

⁸⁶⁰ Van Rappard (2005), p. 144.

⁸⁶¹ See among others Wundt (1896 [1897]), p. 14-15: “Voluntaristic psychology does not by any means assert that volition is the only real form of psychosis, but merely that, [...] it is [...] an essential component of psychological experience [...]. It holds [...] that all other psychical processes are to be thought of after the analogy of volitions, they too being a series of continuous changes in time, not a sum of permanent objects [...].”

⁸⁶² See for example Blumenthal (1980), Van Hoorn (2005), Van Rappard (2005), Erneling & Johnson (2005). Leary (1980, p. 314) likewise argued that “[...] Of the major “new psychologists” Wundt was a vociferous as any in claiming that his psychology was voluntaristic. While there is more than one step from Fichte's idea of voluntarism to Wundt's, there is a historical connection mediated through a host of mid-century psychologists, philosophers and physiologists – including Wundt's mentor, Helmholtz – who followed Fichte in refusing to accept the traditional intellectualist analysis of the mind.”

⁸⁶³ Wundt (1914 [1886]), p. 13.

⁸⁶⁴ Wundt (1897 [1896]), p. 219. Also see Wundt (1897 [1896]), p. 221: “[V]olitional processes are apprehended as unitary processes and as being uniform in character [...] As a result there arises an immediate feeling of this

Furthermore, the feeling of activity is said to be a constitutive dimension of experience, as “we contrast with these active processes all other [...] merely passive experiences.”⁸⁶⁵ In other words: Wundt not only hypothesized that the feeling of activity is generically different from passive, affective states, he moreover established it as the central referential axis from which the possibility of perceptual differentiation and experience arises.⁸⁶⁶

Like in Helmholtz’s theorizing, this perspective on the basic structure of voluntary action furthermore transpired in Wundt’s physiological analyses. More particularly, he hypothesized that the feeling of activity is given through a central, centrifugal signal in the nervous system, that physiologically marks the self-generated nature of voluntary acts, namely the feeling of innervation. Hence, Wundt’s philosophical, autogenetic theory of voluntary action correlated with his physiological ‘theory of central innervation’.⁸⁶⁷

This kind of voluntarism, however, was soon countered by sensationalist theories of action and action-awareness, as those put forward by Hugo Münsterberg and William James, among others.⁸⁶⁸ James explicitly opposed Wundt’s theory of innervation in the second volume of his 1890 *The Principles of Psychology*, in a passage that is at the heart of what would later become known as the “Two Williams Debate.”⁸⁶⁹ This debate revolved mainly around the question of whether self-generated action awareness is central or peripheral in origin.⁸⁷⁰ In contrast to Wundt, James believed that the belief in authorship of action is mediated by, and constructed from peripheral sensory cues. As such, James’ sensationalism transformed the sense of agency into dimension of sense experience. To be more precise, the self-representation of oneself as agent, according to the American psychologist, is constructed in a similar way as perceptual objects, and in a similar vein, self-consciousness is a form of object-consciousness. James attacked Wundt’s doctrine of central innervation and denied that “the will to innervate is felt independently of all its afferent results.”⁸⁷¹ James argued instead that the “consciousness of muscular exertion [...] must be [...] a consequence, and not an antecedent of the movement itself.”⁸⁷² Hence,

unitary interconnection [...], which is most intimately connected with the feeling of activity [...]. This feeling of the interconnection of all single psychical experiences is called the ‘ego’ [...].”

⁸⁶⁵ Wundt (1914 [1886]), p. 7.

⁸⁶⁶ Wundt (1897 [1896]), p. 222.

⁸⁶⁷ See for example Wundt (1904 [1874]), p. 94-103.

⁸⁶⁸ Münsterberg (1888); James (1890).

⁸⁶⁹ James (1890), p. 496-593. Also See Petit (1999), Jeannerod (2006), Tsakiris et al. (2007).

⁸⁷⁰ For a recent analysis of the ‘Two Williams Debate’, see Jeannerod (2006).

⁸⁷¹ James (1890), p. 505.

⁸⁷² James (1890), p. 507.

he maintained that “[t]he entire content and material of our [...] consciousness of movement is of peripheral origin,” i.e., reducible to the last two sensations of Helmholtz’s muscular feeling.⁸⁷³ The conclusion of this sensationalist account of agency, is that voluntary activity is felt passively, i.e. through inflowing sensory signals originating from the muscles.⁸⁷⁴ Hence, agency and volition are dissociated and the volitional subject loses its constitutive status in favor of a view in which the self-reflexivity of action is an *a posteriori* construct, built up from afferent bodily sensations.⁸⁷⁵

Although the controversy between voluntarist and sensationalist accounts of action has been described primarily as a debate concerning the physiological structure of agency, the philosophical stakes of these debates were very high.⁸⁷⁶ More particularly, it pertained to the question of whether the philosophical categories of autonomy and volition could be integrated in a scientific psychology on the one hand, and to disagreements concerning the proper metatheoretical view of the psychological subject on the other. Indeed, discussions about the physiological structure of agency in early psychology, were “part of a normative discourse about the human subject or self.”⁸⁷⁷ As such, it seems that the guiding question of this dissertation, namely that of *how the mind or subject has to be thought* in order to account adequately for the possibility of experience, was revived in early scientific psychology.

5.7 Summary and Conclusion

This chapter took Fichte’s problematization of Kant’s *I think* as a point of departure. Most generally, we argued that Helmholtz’s psychology of the object has demonstrable roots in Fichte’s radicalization and practical articulation of Kant’s principle of pure apperception, and the idealist view of the subject implied in it.

⁸⁷³ James (1890), p. 517.

⁸⁷⁴ James chose the term ‘sensationalist’ to denote this account. See for example James (1890), p. 517.

⁸⁷⁵ Scheerer (1989).

⁸⁷⁶ Jeannerod (2006), for example, presents the debate as an exclusively physiological one.

⁸⁷⁷ Smith (2011), p. 232.

First, this required a thorough analysis of the concept of ‘*metacritique*’ as it arose in the wake of Kant’s transcendental philosophy. As was explained, this notion expresses the post-Kantian endeavor to found and complete the critical project, by formulating a single, uniting principle. As such, ‘*metacritique*’ is an umbrella term, that covers a variety of post-Kantian projects. Within the scope of this investigation, we were especially interested in Fichte’s metacritical philosophy, and the way in which it can be understood as an attempt to overcome Kant’s doctrinal dualism by founding transcendental philosophy in the all-encompassing principle of *the striving subject*. We argued that Fichte’s principle of the *Tathandlung* functions not only as a uniting principle, but more importantly as the basis of a transcendental philosophy of difference and differentiation. To be more precise, Fichte’s *striving subject* transcends Kant’s dualism, not by annihilating the difference between receptivity and spontaneity, but by transforming the former into a function of the latter. For Fichte, the term ‘passive affection’ is only intelligible to the extent that it presupposes a subject that immediately and irreducibly relates to itself in its striving. As such, Fichte’s *metacritique* amounts to the conclusion that the production of difference between the I and the Not-I in experience – as mediated by the feeling of resistance – presupposes a primordial self-reflexive centrifugality on the part of the subject. Interestingly enough, Fichte’s metacritical view of subjectivity also amounted to a particular dual perspective on the body as (i) an organized part of nature on the one hand, and (ii) an articulation of the will on the other. As such, through the concept of bodily articulation, Fichte’s abstract striving subject, is transformed into an embodied, living agent.

In the second part of this chapter, we examined Helmholtz’s psychology of the object against the background of Fichte’s Ego-doctrine. After dealing with some *prima facie* objections against this analysis, we presented evidence supporting a certain continuity between Helmholtz’s account of the role of active experimentation in perception, and Fichte’s philosophy. By focusing on the philosophical dimension in Helmholtz’s theory of agency, we pointed out the triple irreducibility of voluntary action in Helmholtz, i.e. his emphasis that (i) the concept of agency presupposes a non-deterministic view of human action, (ii) is not reducible to a physical or physiological process, and (iii) that the pre-reflexive sense of agency is not reducible to a form of receptive self-awareness. This analysis gradually revealed the centrality of the notions of freedom and autonomy in Helmholtz’s psychological theory, and as such, the way in which the latter was founded in the kind of practical subjectivity that Fichte put forward as the transcendental basis of experience and knowledge. Based on this metatheoretical view of subjectivity, a view of objectification arises, in which the reciprocal limitation of subject and object in experience is constituted in accordance to the dynamical scheme of will and resistance. Hence, the object, in Helmholtz’s theorizing, can only be

constituted as such, by a subject that is conceptualized as an autonomous self-determining agent.

Subsequently, we analyzed the way in which this philosophical view on the necessary structure of agency permeated Helmholtz's physiological analysis of voluntary action. In doing so, we argued that the systematic purport of the concept of muscular feeling, and more particularly, of the notion of the 'effort of will', becomes especially clear when placed against the Fichte's Ego-doctrine. More particularly, we suggested that Helmholtz's analysis of the physiological architecture of voluntary action, is rooted in philosophical voluntarism, and more particularly, in a conception of the subject as an active, striving being. In conclusion, we briefly sketched the 'Two Williams debate' in early scientific psychology, as it illustrates the centrality of the problem of voluntary action in early psychology, and more importantly, the reciprocal determination of metatheoretical views of subjectivity, and psychological theories of perception and experience.

Summary and General Conclusion

In this dissertation, we developed a historical and systematic framework for the analysis of Helmholtz's psychology of the object. The primary aim of this investigation was to provide insight into the internal dynamics of Helmholtz's multi-layered theory of perceptual objectification, and more particularly, into the systematic purport of combining empiricist and transcendental perspectives in addressing the psychological problem of the object. In doing so, we attempted to create an alternative perspective from which to approach Helmholtz's work. 'Alternative', in the sense that we took the philosophical problematization of object experience and objectification in modern philosophy as a point of departure, and as such, decentralized (alleged) historical facts or specific scientific, socio-economic, political events and (r)evolutions, that may have played a role in determining the specific nature of Helmholtz's proto-psychology. This choice of perspective was motivated first and foremost by the systematic nature of the central research question. That is to say, the focal point of this dissertation was not the specific *modality* of Helmholtz's empirico-transcendentalism, but its *finality* in confronting the problem of objectification and experience. Therefore, a key concept throughout this dissertation was that of 'motive'. As such, one could say that the strategy used in this dissertation aligns with Schlegel's description of the historian as a 'retrospective prophet' [einen rückwärts gekehrten Propheten]: in order to grasp the systematic purport of present and past events – or historical theories, in our case – they should be considered as meaningful points or transitional moments in the dynamical development of ideas.⁸⁷⁸ Of course, that is not to say that the existing *histories* or modes

⁸⁷⁸ Schlegel as quoted in Cassirer (1944), p. 225. The decentralization of factual historical information in this endeavor is a consequence of what Cassirer called the non-reducibility of the category of *meaning*, to that of *being*. See Cassirer (1944), p. 246-247: "[I]t is impossible to 'reduce' historical thought to the method of scientific thought. [...] Here we are not moving in a physical but in a symbolic universe. And for understanding and interpreting symbols we have to develop other methods than those of research into causes. The category of meaning is not to be reduced to the category of being. If we seek a general heading under which we are to subsume historical knowledge we may describe it not as a branch of physics but as a branch of semantics. The

of interpreting Helmholtz's theory have not provided a tremendously valuable background to this analysis. The particular angle of this dissertation, however, could add another, novel dimension to the available secondary literature.⁸⁷⁹

In order to gain insight in the systematic purport of Helmholtz's empirico-transcendentalism, we constructed an interpretive historical framework (or an *ideal narrative* if you will) that covered the history of philosophical reflections on the foundation and psychogenesis of (the belief in) externality from Hume and Mill, over Kant, to Fichte. We considered these figures as historical representatives of the empirical, critical, and metacritical levels of analysis that are entangled in Helmholtz's work. We argued that the historical progression from one level of analysis seemed to be mediated first and foremost by an increasing problematization of the *experiencing subject*. The problem of subjectivity in turn provided a valuable perspective from which to grasp the meaning and internal dynamics of Helmholtz's multi-layered psychology of the object. In what follows, we will briefly summarize the main insights and conclusions derived from this investigation.

Before going into the subsequent levels of analysis of Helmholtz's psychology, we first needed to get a firm grasp of the philosophical and psychophysiological foundations of Helmholtz's conceptualization of the perceptual process as a process of meaning-production, mediated by psychological processes of interpretation. Most generally, we pinpointed Helmholtz's rejection of the Leibnizian idea of a pre-established harmony between subject and object as the foundational thought of his semiotic understanding of the perceptual process. We argued that Helmholtz's work started out from what Foucault once called 'modernity's most radical epistemological event', i.e. the assumption of a radical discontinuity between the world of things, and the subjective states of affection, acts of representation and interpretation. As explained, the impact of Müller's *Law of Specific Nerve Energies* on Helmholtz's physiological epistemology in this respect, can hardly be overestimated. We argued that perceptual objectification emerged as a psychological problem in Helmholtz's

rules of semantics, not the laws of nature, are the general principles of historical thought." Also see Cassirer (1912). We could also refer to Fichte (1801, p. 176) at this point, who emphasized that the task of the philosopher is not to determine the facts, but to construct (not *reconstruct*) modes of determination, i.e. to treat the facts *as if* they were the result of an original construction. "To consider this [ideal] *as if*, as a categorical *that* [dass]," Fichte adds, would be a "a big misunderstanding."

⁸⁷⁹ I am referring for example to the political/ideological perspective on Helmholtz's work as put forward by Lenoir (1997), the consideration of Helmholtz's theory of perception from the perspective of paradigm changes in the history of science as presented by Turner (1994), or the interpretation of Helmholtz's work against the background of German Enlightenment (e.g., Cahan, 1993).

theorizing mainly as a consequence of his adherence to the epistemological consequences of Müller's law on the one hand, and his psychological anti-reductionism on the other.

Next, we considered the subsequent levels of analysis in Helmholtz's psychology by means of the historical and systematic framework just outlined. First, this entailed an investigation of the empiricist or methodologically naturalist mode of analyzing the formative history of the concept of 'thinghood' in the mind. To this end, we studied the relevant sections of Hume's and Mill's work, and contrasted them with the common-sense tradition in philosophy. Subsequently, we discussed the way in which Helmholtz's understanding of the perceptual process in terms of the associative connection of 'circles of presentables' is continuous with the empirical (associationist) tradition in general, and with Mill's account of the belief in externality in particular. However, as Helmholtz's account is not exhausted by its empirical dimension, we were prompted to consider the 'aporetic corners of empiricism' that would provide a systematic motive for Helmholtz's move beyond the strict empiricist framework. Through an in-depth study of Hume's *Labyrinth* (and Mill's reproduction of it) we were led to the conclusion that the orthodox associationist theory of the object lacks a normative foundation in general, and has problems accounting for *associability* on the one hand, and *differentiality* on the other.

First, we considered the problem of *associability*, or the normative conditions underlying the possibility of association. This problem is founded in what Kitcher called the 'promiscuity of association', i.e. the fact that in principle, everything can be associated with everything.⁸⁸⁰ As such, mechanistic association of sensations cannot in and by itself account for the genesis of the belief in continued and distinct existence. This so-called 'promiscuity' could in fact pose a serious threat to the internal consistency of the associationist theory of the object, and the intelligibility of associationist psychology in general. One possible strategy to overcome this objection is by presuming a 'real' affinity between sensations, that would provide the necessary and sufficient basis of their associative connection in the mind. In that case, associability would be founded in a real connection between (certain groups of) sensations. Both Hume and Mill, however, vehemently denied the intelligibility of such real connections. Therefore, one is automatically led to consider the normative subjective principles that guide and found the associative process, and that would explain why certain sensations are associated, while others are not. Neither Hume's nor Mill's empiricist methodologies however, allowed them to take any other principles into account than those derived

⁸⁸⁰ See for example Kitcher (1990), p. 79.

from experience. As a consequence, both faced serious problems if it came to addressing the problems of associability and the synthetic unity of experience. More particularly, both developed (and retracted) empiricist theories of subjectivity that were inconsistent with the experiencing subject presupposed by their theories of objectification, and eventually abandoned the question of subjectivity altogether. Hume indeed “needs what he can’t have”, i.e., “[h]is philosophy [...] relies on a richer idea of the mind or self than his empiricist principles allow him.”⁸⁸¹ Furthermore, the associationist theories of the mind (e.g., Hume’s Bundle theory) assimilate the idea of the self and that of the object, which entails a correlative reduction of self-consciousness to a form of object-consciousness. This kind of ‘objectal subjectivity’, however, leads to an infinite regress if it comes to explaining how an object can appear in experience as opposed to, and differentiated from, the subject.

We have pinpointed these problems as the systematic motives for the transgression of the empiricist framework in general, and for Helmholtz’s allegiance to Kant’s and Fichte’s analyses of experience in particular. That is to say, although Helmholtz’s semiotic theory of perception accepted that the transition from sign-sensations to meaning-objects is mediated by *a posteriori* associative processes, he never reduced the process of objectification to a sort of mental mechanics. Quite on the contrary, he explicitly sought to determine the subjective elements underlying the possibility of objectification, and in doing so, placed himself in the transcendental tradition of philosophy.

In exploring the transcendental perspective on objectification, we started out with an analysis of the way in which Kant’s doctrines of synthesis and apperception can be interpreted as a response to the problems surrounding Hume’s *Labyrinth*. Not only did we find in Kant’s work an accurate diagnosis of the causes of the empiricist *aporia* about the subject – i.e., the confusion between normative principles of experience and experiential contents – we likewise found some first important steps towards its possible solution. First, Kant’s doctrine of synthesis addressed the problem of the necessary connecting principle of experience (or the problem of associability), by introducing subjective *a priori* principles of understanding to guide and found the associative process. Second, Kant established the principle of pure apperception, i.e. the necessary self-reflexivity of the Ego, as the highest principle of cognition, the foundation of the difference between the representing (subject) and the represented (object), and the precondition of all experience.

⁸⁸¹ Strawson (2011), p. 34, 154.

Following up on the post-Kantian reception of the critical system, however, we also explored the possible problems surrounding Kant's pure apperception. More particularly, we examined the way in which the *postulate* of apperception at once implies the positing of a primitive or unanalyzable subject-object differentiability, i.e. a duality between the activity of thinking, and passive receptivity. Subsequently, we turned to Fichte's attempt to overcome this dogmatic residue in Kant's system, and to demonstrate what Kant had postulated, i.e., the conditions underlying the differential structure of consciousness, and the nature of the necessary self-reflexivity of the I. Hence, our analysis took Fichte's Ego-doctrine to be first and foremost a *philosophy of difference*.

In completing and radicalizing Kant's project, Fichte established *negation* as the central operator in the objectification process, and accordingly, defined objective experience as the positing of resistance. The intelligibility of the concept of resistance or negativity in Fichte's theorizing, in turn hinged on the positive determination of the Ego as activity. Therefore, the subject that is presupposed at the foundation of the transcendental analysis of experience is conceptualized by him as a *Tathandlung*, i.e., an ideal act of self-positing, and an eternal centrifugal activity. In Fichte's philosophical system, this striving subject is at the foundation of the dynamical constitution of the subject-object opposition, in accordance to the general scheme of will and resistance. That is to say, it is only for the active subject, in Fichte's theorizing, that the object or Not-I can appear in its capacity of negativity or resistance. Subsequently, we discussed the way in which Fichte's Ego-doctrine and the dynamical theory of objectification that follows from it entail a reconceptualization of Kant's principle of pure apperception along the lines of practical philosophy. More particularly, we explored how Fichte transformed Kant's highest principle of experience, the *I think*, into an *I act*, and as such, posited the autonomous, free subject at the basis of all experience and knowledge. To conclude our discussion of Fichte's philosophy, we examined the way in which his Ego-doctrine determined his view of the human body as an *articulation* of the will, i.e., as an autonomous and self-determining structure, that is moreover necessarily appreciated as such by the experiencing subject.

In relating Helmholtz's psychology to these critical and metacritical levels of analysis, we first of all argued that the empirical dimension of Helmholtz's psychology is founded in a critical, Kantian inspired analysis of the necessary structure of perceptual understanding. In doing so, we analyzed the much debated issue of Helmholtz's appropriation of Kant's apriorism with regard to the causal law. As is well known, Helmholtz emphasized that the perceptual process is governed by the a priori rule that every effect has a cause. From the historical and systematic framework developed in this dissertation, Helmholtz's apriorism in this respect can be interpreted as an attempt to account for the *associability* of sensation, or in other words, as an attempt to found his

empirical account in normative *a priori* principles of subjective spontaneity. In addition to the classical interpretive issues with Helmholtz's Kantianism in this respect, we considered Helmholtz's use of the causal law from the perspective of his criticism of Kant's doctrinal dualism. In doing so, we argued that Helmholtz's causal law seems to operate on a more primitive level of experience in comparison in Kant's theorizing, i.e., whereas Kantian causality imposes a form upon sensible matter, Helmholtz's causality is a constitutive condition for receptivity itself. Without the *a priori* causal structure of understanding, sign-sensations would simply not be capable of referring to anything beyond themselves. Through this analysis, we were prompted to consider Helmholtz's self-professed ambition to overcome the Kantian dualism between intuition and understanding, by establishing the subject's spontaneity as a condition of possibility for passivity experience. Hence, the point of reference for our interpretation of Helmholtz's psychology gradually shifted from Kant, to the post-Kantian, metacritical appraisal of experience. Helmholtz's criticism of Kant's theory of space provided us with a first occasion to explore the structure and purport of what we might call Helmholtz's metacritical problematization of experience. We argued that this criticism did not entail an annihilation of the Kantian apriorism with respect to space, but rather a shift from space as a constitutive condition for experience, to the *free mobility of rigid bodies* as a condition of possibility for spatial construction and perceptual differentiation. Furthermore, we suggested that this shift seemed to be motivated at least in part by a dissatisfaction with the dogmatic residues in Kant's critical analysis, namely the unanalyzed assumption of a duality between the I and the Not-I in general, and the spatial and the non-spatial in particular.

Finally, we analyzed the continuity between Fichte's metacritical expansion and radicalization of Kant's principle of apperception, and Helmholtz's analysis of the role of voluntary action in perception. Most generally, we argued that Helmholtz's theory of perception is founded in a similar dynamical view of objectification that takes the dialectics of will and resistance to be the ultimate basis of the perceptual process. Furthermore, we argued that Fichte's view of the striving subject, that underlies this particular dynamical perspective on experience, transpires in Helmholtz's psychological theory. More particularly, Helmholtz's psychology of the object seems to be founded in a Fichtean (practical) view of the subject as a *free*, autonomous being, that escapes deterministic natural causality. To be a perceiver, for Helmholtz, is to be a free agent, and knowingly so. Subsequently, we took a look at the way in which Helmholtz translated these philosophical views in his physiological analysis of the architecture of voluntary action. In doing so, we focused on the concept of *Willensanstrengung* in particular, i.e. the non-reducible, centrifugal feeling of effort, that is one of the building blocks of Helmholtz's *Muskelgefühl*, and more importantly, a constitutive element of self-generated action awareness. We suggested that the philosophical significance of the hypothesis of the *Willensanstrengung* can be explained by means of Fichte's concept of

the articulation: the sense of agency is not primarily derived through what Fichte called the ‘outer sense’, but first and foremost through the internal bodily articulation of goals and intentions.

At the end of chapter 5, we also briefly discussed the so-called ‘Two-William Debate’, that put the problem of the architecture of the voluntary act, and the origin of self-generated action awareness, high on the agenda in early scientific psychology. Most importantly, however, we suggested that important philosophical issues were at stake in these debates, pertaining mostly to metatheoretical views of the psychological subject.

In conclusion, it is interesting to note that many of the debates we have touched upon in the course of this dissertation, still persist up to this day. For one thing, the so-called ‘enactive’ approach to perception has thrived in the past decades. This approach assigns a constitutive role to so-called ‘sensorimotor understanding’ in experience, and hence, starts out from the basic premise that “to be a perceiver is to understand, implicitly, the effects of movement on sensory stimulation.”⁸⁸² Many questions arise, however, with respect to the theoretical foundation, and purport of the notion of ‘sensorimotor understanding’, the most important one being formulated by Thompson as follows:⁸⁸³

The dynamic sensorimotor approach needs a notion of selfhood or agency, because to explain perceptual experience it appeals to sensorimotor knowledge. Knowledge implies a knower or agent or self that embodies this knowledge. But what organization does a sensorimotor system need to have in order to be a genuine sensorimotor agent [...]?

In other words, the concept of ‘sensorimotor understanding’, according to Thompson, necessitates an account of the nature and structure of ‘sensorimotor subjectivity’. To be sure, O’Regan and Myin, for example, spent quite some effort analyzing the subjective dimension of experience. They argued among others, that the phenomenal experience of ‘ongoingness’ and ‘forcible presence’, are two of the most salient subjective dimensions of *what it is to see*.⁸⁸⁴ On the one hand, perceptual

⁸⁸² Noë (2004), p. 11, 117-122. Also see Roberts (2010), p. 101: “Perceptual content, according to sensorimotor theories is brought forth through a process of active, exploratory engagement with the world. Experiences are the outcome of more than a simple reception of sensory information: they depend upon a sensitive and dynamic relationship between perceiver and object, and ongoing give-and-take that enables the coupling of one with the other over time.”

⁸⁸³ Thompson (2005), p. 417.

⁸⁸⁴ Myin & O’Regan (2002).

experience, according to them, is “experienced as occurring to me [...] as though I was in inhabited by some ongoing process” (ongoingness). On the other hand, experience is per definition the experience that something “imposes itself on me from the outside, and is present to me without my making any mental effort, and [...] is mostly out of my voluntary control” (forcible presence).⁸⁸⁵ However these descriptions have nothing to do with metatheoretical views of subjectivity, and still less do they describe “the non-object-directed or intransitive self-awareness constitutive of experience.”⁸⁸⁶ Quite on the contrary, both these subjective dimensions are defined in reference to object-experience, and mediated by intentional consciousness. As such, they seemingly reduce subjective experience to its “world-representing components.”⁸⁸⁷ As a consequence, the theory possibly faces the problems of circularity and infinite regress related to ‘objectal’ accounts of subjectivity.⁸⁸⁸ Therefore, a number of authors have argued that the concept of ‘sensorimotor understanding’ needs to be enriched with an account of the unmediated sense of *being an agent*, that is a constitutive dimension of enactive perception.⁸⁸⁹ By integrating this primitive sense of self-awareness, the possible objection just raised, and the explanatory gap between (i) the metatheoretical view of the subject as autonomous and (ii) the ‘objectal’ account of sensorimotor subjectivity can be overcome.

In addition to these contemporary philosophical debates, the questions of selfhood and agency in perception has been revived as a consequence of recent neurophysiological research. This revival was instigated first and foremost by Von Holst & Mittelstaedt, who argued for the central generation of action awareness and hence for the non-peripheral nature of “[...] forces of organization – of coordination and control.”⁸⁹⁰ In contemporary neurophysiological literature, the return of the ‘Helmholtzian’ model of perception and action control is known as the efference copy or comparator model, that unfolds from the following basic insight:⁸⁹¹

⁸⁸⁵ Myin & O’Regan (2002), p. 30.

⁸⁸⁶ Thompson (2005), p. 419.

⁸⁸⁷ Legrand (2007), p. 585.

⁸⁸⁸ See Thompson (2005), Legrand (2007). Regarding the problem of infinite regress, see Shoemaker (1968).

⁸⁸⁹ See for example Thompson (2005), Legrand (2007), Gallese & Sinigaglia (2010).

⁸⁹⁰ Von Holst & Mittelstaedt (1971 [1950]), p. 41.

⁸⁹¹ Westheimer (2008), p. 6-7. It is interesting to point out that at first sight, there seems to be at least a superficial similarity between the notion of efference copy and Fichte’s *Vorbild* or ‘ideal prefiguration’ (see section 5.4). The extent of this possible systematic similarity, however, remains to be analyzed.

[...] Helmholtz [...] [asserted] that our knowledge [...] is derived by using our motor system as an exploring organ [...] Generating a movement is the activity of the 'I' which keeps track of the instructions. (A modern term is efference copy, meaning the record that is maintained of the outgoing efferent signals from the central nervous system to the muscles.) The associated change in sensory signals is registered, and inferences can be drawn from a 'before' and 'after' comparison. Through knowledge of the actuated movement it can be determined what in the changes of the sensory impressions can be ascribed to the movements; what remains, by inference is of the real world.

In accordance with the Helmholtzian view of perception, the comparator model hypothesizes that perception emerges from a comparison between an internal prediction about the expected sensory consequences of motor commands, and actual sensory feedback. Perception, in this account, "reflects the error generated by this comparison."⁸⁹² In the past years, a string of research has been published arguing that the centrifugal 'sense of effort' is a central component of self-experience, and conversely, that a defect in this centrally generated self-reflexivity causes the diminished self-experience that is a hallmark of psychotic and schizophrenic symptoms.⁸⁹³ More particularly, it is hypothesized that reality disturbances and positive symptoms (hallucinations, delusions, etc.) emerge from a malfunctioning of the efference copy mechanism, or the self-monitor that indexes voluntary actions as self-generated. As a consequence, the perceptual process lacks a referential axis and "internally generated information, such as one's own thoughts and intentions, would then be perceived as originating externally."⁸⁹⁴ What seems to be especially impaired is pre-reflective sense of agentive subjectivity, or in philosophical terms, of internally articulated bodily self-consciousness.

However, this model has also revived philosophical discussions pertaining to the question of the naturalizability of the self or subject. As Synofzik et al. write, for example, the efference copy model can be interpreted as a part of the broader project of constructing a "comprehensive naturalistic account" of selfhood and subjectivity.⁸⁹⁵

⁸⁹² Voss et al. (2010), p. 3105.

⁸⁹³ In this context, see for example Von Holst & Mittelstaedt (1971 [1950]), Frith (1992), Frith et al. (2000), Sass & Parnass (2003), Bazan (2007), Synofzik et al. (2008a), and Lafargue & Franck (2009).

⁸⁹⁴ Voss et al. (2010), p. 3105. Also see Fu & McGuire (2003), p. 427: "According to this model, self-awareness arises from an internal 'self-monitor' that receives information about an intended action [...]. Thus, if hallucinations arise from inner speech, then the problem is not that inner speech is being generated but that there is impaired self-monitoring: the ability to recognize its origin as being from oneself, and a subsequent misattribution to external sources."

⁸⁹⁵ Synofzik et al. (2008a), p. 411.

According to some, this leads us right back into Hume's *Labyrinth*. Frank, for example, criticizes the alleged circularity of the approach:⁸⁹⁶

[H]ow can the copy of a *de re* self-referring loop which involves no consciousness, [...] generate self-consciousness without changing or falsifying the thing that is copied? [...] [T]hat which, according to the model, should function as the criterion for whether an action is one's own, has no ownness to it and therefore [...] cannot function as the criterion. [...] '[R]eflective self-understanding of [one's] own engagement with the world' (Campbell, 2004, p. 487) presupposes a non-reflective consciousness of the subject as well as of its mental states. This necessary pre-condition is something that the comparator-model does not account for.

In other words, once again, the concern raised is that the model does not account for the "non-objectifying form of self-consciousness" that is presupposed by and precedes the self as an intentional object of experience.⁸⁹⁷ As a consequence, the model allegedly ends up in the circular mode of explanation that was once pinpointed by Kant as the unavoidable consequence of every attempt to naturalize or objectify the *I think* that should be able to accompany all representations (see section 4.5). To restate the quotation of Kant in this respect:⁸⁹⁸

That which should necessarily be represented as numerically identical cannot be thought of as such through empirical data. There must be a condition that precedes all experience and makes the latter itself possible [...].

These contemporary debates illustrate the possible contemporary relevance of the analysis presented in this dissertation.

As Hatfield noted, "[t]here is no danger that the mysteries of seeing will be completely solved in the near future."⁸⁹⁹ If anything, this dissertation has pointed out that the question of the psychogenesis of the object indeed constitutes a borderland between the exact sciences and philosophy, as Helmholtz insisted. Although the problem has been recuperated by the exact sciences at present, it remains a multi-dimensional issue, that calls for metaphysical, epistemological, philosophical and physiological reflection. As is illustrated by the discussions sketched above, the problems of the nature of subjectivity, the structure of voluntary action, and the basic architecture of man's relation to the world, have never been far away, and resurge with

⁸⁹⁶ Frank (2007).

⁸⁹⁷ Legrand (2007), p. 587.

⁸⁹⁸ CPR [A107].

⁸⁹⁹ Hatfield (2009), p. 35.

a unforeseen urgency in the wake of current attempts to naturalize subjectivity. The observation that “there is no such thing as ‘just doing science’ without also producing philosophy” applies to the study of perception especially.⁹⁰⁰ An in-depth historical understanding of the philosophical problems that are at stake when dealing with the problem of perception, could prove to be a valuable compass in navigating the proliferation of different points of view, as well as a tool for a critical inquiry into the limits of the natural sciences when it comes to answering the question of *what it is to see*, and the related problem of *what the mind or subject must be like* to make sense of the underdetermined world of nervous excitation.

⁹⁰⁰ Hatfield (2009), p. 35.

Bibliography

- Abrams, M.H. (1953). *The Mirror and the Lamp*. Oxford: Oxford University Press.
- Ainslie, D.C. (2011). Hume on Personal Identity. In Radcliffe (Ed.), *A Companion to Hume*: 140-156. West Sussex: John Wiley & Sons.
- Allik, J. & Konstabel, K. (2005). G.F. Parrot and the Theory of Unconscious Inferences. *Journal of the History of the Behavioral Sciences* 41(4): 317-330.
- Allison, H.E. (1995). On Naturalizing Kant's Transcendental Psychology. *Dialectica* 49(2-4): 335-351.
- Allison, H.E. (2004). *Kant's Transcendental Idealism*. New Haven: Yale University Press.
- Allison, H.E. (2008). *Custom and Reason in Hume: A Kantian Reading of the First Book of the Treatise*. Oxford: Oxford University Press.
- Ameriks, K. (1982). *Kant's Theory of Mind*. Oxford: Oxford University Press.
- Ameriks, K. (2000). The Practical Foundation of Philosophy in Kant, Fichte, and After. In Sedgwick (Ed.), *The Reception of Kant's Critical Philosophy*: 109-128. Cambridge: Cambridge University Press.
- Baur, M. (2003). Kant, Lonergan, and Fichte on the Critique of Immediacy and the Epistemology of Constraint in Human Knowing. *International Philosophical Quarterly* 43(1): 91-112.
- Bazan, A. (2007). *Des Fantômes dans la Voix*. Montréal: Editions Liber.
- Beck, G. (1996). From Kant to Hegel – Johann Gottlieb Fichte's Theory of Self-Consciousness. *History of European Ideas* 22(4): 275-294.
- Beiser, F.C. (1987). *The Fate of Reason. German Philosophy from Kant to Fichte*. Cambridge: Harvard University Press.
- Beiser, F.C. (2002). *German Idealism: The Struggle Against Subjectivism*. London: Harvard University Press.
- Berrios, G.E. & Gili, M. (1995). Will and its disorders: a conceptual history. *History of Psychiatry* 6: 87-104.
- Bernfeld, S. (1944). Freud's Earliest Theories and the School of Helmholtz. *The Psychoanalytic Quarterly* 13: 341-362.
- Biran, M. (2005 [1807]). *De L'aperception Immédiate*. Paris: Brodard & Taupin.
- Biro, J. (1993). Hume's New Science of Mind. In Norton & Taylor (Eds.), *The Cambridge Companion to Hume*: 33-63. Cambridge: Cambridge University Press.
- Blakemore, S.J. & Frith, C. (2003). Self-awareness and Action. *Current Opinion in Neurobiology* (13): 219-224.
- Blumenthal, A.L. (1980). Wilhelm Wundt. Problems of Interpretation. In W.G. Bringmann and R.D. Tweney (Eds.), *Wundt Studies*: 435-445. Toronto: Hogrefe.
- Boring, E.G. (1950). *A History of Experimental Psychology*. New York: Appleton – Century – Crofts, Inc.
- Bowler, P.J. & Morus, I. R. (2005). *Making Modern Science*. Chicago: University of Chicago Press.

- Boyle, N. (1987). A Modern Faust. In *Boyle, Faust Part I*: 25-51. Cambridge: Cambridge University Press.
- Bradley, F.H. (1876). *Ethical Studies*. London: G.E. Stechert & Co. New York.
- Breazeale, D. (1981). Fichte's 'Aenesidemus' Review and the Transformation of German Idealism. *The Review of Metaphysics* 34(3): 545-568.
- Broman, T.H. (1996). *The Transformation of German Academic Medicine, 1750-1820*. Cambridge: Cambridge University Press.
- Brook, A. (1994). *Kant and the Mind*. Cambridge: Cambridge University Press.
- Brown, T. (1850). *Lectures on the Philosophy of the Human Mind*. Boston: Carter & Co.
- Brown, J.K. (2002). Faust. In Sharpe (Ed.), *The Cambridge Companion to Goethe*: 84-100. Cambridge: Cambridge University Press.
- Brücke, E. (1885). *Vorlesungen über Physiologie. Erster Band*. Wien: Wilhelm Braumüller.
- Burton, J.H. (1846). *Life and Correspondence of David Hume* (Vol. 1). Edinburgh: William Tait.
- Burwick, F. (1986). *The Damnation of Newton: Goethe's Color Theory and Romantic Perception*. Berlin: Walter de Gruyter.
- Cahan, D. (1993a). *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*. London: University of California Press.
- Cahan, D. (1993b). *Letters of Hermann von Helmholtz to his Parents*. Stuttgart: Franz Steiner Verlag.
- Cassedy, S. (2008). A History of the Concept of Stimulus and the Role it Played in the Neurosciences. *Journal for the History of Neuroscience* 17(4): 405-432.
- Cassirer, E. (1912). Hermann Cohen und die Erneuerung der Kantischen Philosophie. *Kant-Studien* 17: 252-273.
- Cassirer, E. (1922). *Das Erkenntnisproblem*. Berlin: Verlag Bruno Cassirer.
- Cassirer, E. (1944). *An Essay on Man*. New York: Doubleday & Company.
- Cassirer, E. (1951 [1932]). *The Philosophy of the Enlightenment*. Princeton: Princeton University Press.
- Cassirer, E. (1969 [1950]). *The Problem of Knowledge*. London: Yale University Press.
- Chisholm, R.M. (1969). On the Observability of the Self. *Philosophy and Phenomenological Research* 30(1): 7-21.
- Coffa, J.A. (1991). *The Semantic Tradition from Kant to Carnap*. Cambridge: Cambridge University Press.
- Cohen, H. (1871). *Kants Theorie der Erfahrung*. Berlin: Dümmler's Verslagbuchhandlung.
- Conrat, F. (1903). *Hermann von Helmholtz' Psychologische Anschauungen*. Halle: Verlag von Max Niemeyer.
- Cooksey, T.L. (2006). *Masterpieces of Philosophical Literature*. Connecticut: Greenwood Publishing.
- Crary, J. (1992). *Techniques of the Observer*. Cambridge: MIT Press.
- Crone, R.A. (1997). Schopenhauer on Vision and the Colors. *Documenta Ophthalmologica* 93: 61-71.
- Darrigol, O. (2003). Number and Measure: Hermann von Helmholtz at the Crossroads of Mathematics, Physics and Psychology. *Studies in the History and Philosophy of Science* 34(3): 515-573.
- Daston, L. & Galison, P. (2007). *Objectivity*. Cambridge: MIT Press.
- DeBord, C.E (2012). Kant, Fichte, and the Act of the I. *Philosophy Study* 2(1): 9-18
- De Kock, L. (forthcoming, 1). Hermann von Helmholtz's Empirico-Transcendentalism Reconsidered: Construction and Constitution in Helmholtz's Psychology of the Object. *Science in Context*.
- De Kock, L. (forthcoming, 2). Voluntarism in Early Psychology: The Case of Hermann von Helmholtz. *History of Psychology*.
- Deleuze, G. (1991 [1953]). *Difference and Repetition*. Translated by P. Patton. New York: Continuum.
- Demeter, T. (2012). Hume's Experimental Method. *British Journal for the History of Philosophy* 20(3): 577-599.

- DiSalle, R. (1993). Helmholtz's Empiricist Philosophy of Mathematics: Between Laws of Perception and Laws of Nature. In Cahan (Ed.), *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*: 498-521. California: University Press.
- Disalle, R. (2006). Kant, Helmholtz, and the Meaning of Empiricism. In Friedman (Ed.), *The Kantian Legacy in Nineteenth-Century Science*: 123-140. Cambridge: MIT Press.
- Du Bois-Reymond, E. (1912). Die sieben Welträtsel. In du Bois-Reymond, *Reden von Emil du Bois-Reymond. Zweiter Band*: 65-98. Leipzig: Veit & Comp.
- Eisler, R. (1904). *Wörterbuch der Philosophischen Begriffe*. Nerlin: Ernst Siegfried Mittler und Sohn.
- Eisler, R. (1984). *Kant-Lexicon*. Hildesheim: Georg Olms Verlag.
- Erneling, C. E. & Johnson, D.M. (2005). *The Mind as a Scientific Object: Between Brain and Culture*. Oxford: Oxford University Press.
- Erdmann, B. (1921). Die Philosophischen Grundlagen von Helmholtz' Wahrnehmungstheorie. *Abhandlungen der Preussischen Akademie der Wissenschaften* 21: 3-25.
- Falkenburg, B. (2007). *Particle Metaphysics. A Critical Account of Subatomic Reality*. Heidelberg: Springer.
- Falkenstein, L. (1997). Naturalism, Normativity, and Scepticism in Hume's Account of Belief. *Hume Studies* 23(1): 29-72.
- Farré, R. (2002). *Cognitive Science: A Philosophical Introduction*. London: Sage Publications.
- Foucault, M. (1989 [1966]). *The Order of Things*. Translation Tavistock/Routledge. New York: Routledge.
- Ferrari, M. (1997). *Retours à Kant*. Paris: Editions du Cerf.
- Fichte, J.G. (1845 [1792]). Recension des Aenesidemus oder über die Fundamente der vom Herrn Prof. Reinhold in Jena gelieferten Elementarphilosophie. In J.H. Fichte (Ed.), *Johann Gottlieb Fichte's sämtliche Werke* (Vol. I): 1-25. Berlin: Verlag von Veit und Comp.
- Fichte, J.G. (2000 [1796/97]). *Foundations of Natural Right*. Translated by M. Baur. Cambridge: Cambridge University Press.
- Fichte, J.G. (1997 [1794]). *Grundlage der gesamten Wissenschaftslehre*. Hamburg: Felix Meiner.
- Fichte, J.G. (1984 [1797/98]). *Versuch einer neuen Darstellung der Wissenschaftslehre*. Hamburg: Felix Meiner Verlag.
- Fichte, J.G. (1982 [1794, 1797/98]). *The Science of Knowledge (with the First and Second Introductions)*. Translated by P. Heath & J. Lachs. Cambridge: Cambridge University Press.
- Fichte, J.G. (1798). *Das System der Sittenlehre*. Leipzig: Christian Ernst Gabler.
- Fichte, J.G. (2005 [1798]). *The System of Ethics*. Translated by D. Breazeale. Cambridge: Cambridge University Press.
- Fichte, J.G. (1992 [1796/99]). *Foundations of Transcendental Philosophy. Wissenschaftslehre Nova Methodo*. Translated by D. Breazeale. London: Cornell University Press.
- Fichte, J.G. (1858 [1800]). *The Vocation of Man*. Translated by W. Smith. London: John Chapman.
- Fichte, J.G. (1801). *Sonnenklarer Bericht*. Berlin: Realschulbuchhandlung.
- Fichte, J.G. (1817). *Die Thatsachen des Bewusstseins*. Stuttgart: Gottaischen Buchhandlung.
- Fichte, J.G. (2008 [1817]). *Facts of Consciousness*. Translated by A.E. Kroeger. Berkshire: Dodo Press.
- Finger, S. & Wade, N.J. (2001). The Eye as an Optical Instrument: from Camera Obscura to Helmholtz's Perspective. *Perception* 30: 1157-1177.
- Finger, S. & Wade, N.J. (2002a). The Neuroscience of Helmholtz and the Theories of Johannes Müller. Part 1: Nerve Cell Structure, Vitalism and the Nerve Impulse. *Journal of the History of the Neurosciences* 11(2): 136-155.
- Finger, S. & Wade, N.J. (2002b). The Neuroscience of Helmholtz and the Theories of Johannes Müller. Part 2: Sensation and Perception. *Journal of the History of the Neurosciences* 11(3): 234-254.
- Frank, M. (2002). *Selbstgefühl*. Frankfurt am Main: Suhrkamp.
- Frank, M. (2004). Fragments of a History of the Theory of Self-Consciousness from Kant to Kierkegaard. *Critical Horizons. Journal of Social and Critical Theory* 5: 83-136.
- Frank, M. (2007). Non-Objectal Subjectivity. *Journal of Consciousness Studies* 14(5-6): 152-173.

- Fraser, A.C. (1865). Mill's Examination of Sir William Hamilton's Philosophy. *North British Review* 43: 1-58.
- Friedman, M. (2000). *A Parting of the Ways*. Chicago: Open Court.
- Friedman, M. (2001). *Dynamics of Reason: The 1999 Kant Lectures at Stanford University*. Stanford: CSLI publications.
- Friedman, F. (2006). *The Kantian Legacy in Nineteenth-Century Science*. Cambridge: MIT Press.
- Friedman, F. (2009). Einstein, Kant, and the Relativized A priori. In Bitbol (Ed.), *Constituting Objectivity*: 253-267. New York: Springer.
- Frith, C.D. (1992). *The Cognitive Neuropsychology of Schizophrenia*. Sussex: Lawrence Erlbaum.
- Frith et al. (2000). Explaining the Symptoms of Schizophrenia: Abnormalities in the awareness of action. *Brain Research Reviews* 31: 357-363.
- Fullinwider, S.P. (1990). Hermann von Helmholtz: the Problem of Kantian Influence. *Studies in the History of the Philosophy of Science* 21(1): 41-55.
- Gallagher, S. (2004). Neurocognitive Models of Schizophrenia: A Neurophenomenological Critique. *Psychopathology* 37: 8-19.
- Gallese, V. & Sinigaglia, C. (2010). The Bodily Self as Power for Action. *Neuropsychologia* 48(3): 746-755.
- Gadamer, H.G. (2006 [1975]). *Truth and Method*. London: Continuum.
- Goethe, J.W. (1871 [1808/1832]). *Faust. A Tragedy*. Translated by B. Taylor. Boston: James Osgood.
- Goethe, J.W. (1877 [1808/1832]). *Faust. Erster und Zweiter Teil*. München: Deutscher Taschenbuch Verlag.
- Goethe, J.W. (2005 [1808]). *Faust, Part I*. Translated by D. Constantine. London: Penguin Books.
- Goethe, J.W. (1840 [1810]). *Theory of Colours*. Translated by C.L. Eastlake. London: John Murray.
- Goethe, J.W. (2005 [1832]). *Faust, Part II*. Translated by D. Constantine. London: Penguin Books.
- Goldschmidt, L. (1898). *Kant und Helmholtz*. Hamburg: Leopold Voss.
- Guyer, P. (2008). *Knowledge, Reason and Taste*. Princeton: Princeton University Press.
- Hagner, M. & Währig-Schmidt, B. (1992). *Johannes Müller und die Philosophie*. Berlin: Akademie Verlag.
- Hallet, D. (2009). On the Subject of Goethe: Hermann von Helmholtz on Goethe and Scientific Objectivity. *Spontaneous Generations: A Journal for the History and Philosophy of Science* 31: 178-194.
- Hamilton, A. (1998). Mill, Phenomenalism, and the Self. In Skorupski (Ed.), *A Cambridge Companion to Mill*: 139-175. Cambridge: Cambridge University Press.
- Hamilton, W. (1859). *Lectures on Metaphysics and Logic* (Vol. I). Boston: Gould and Lincoln.
- Hamilton, W. (1861). The Regulative Faculty: The Philosophy of the Conditioned. In Bowen (Ed.), *The Metaphysics of Sir William Hamilton*: 499-530. Cambridge: Sever and Francis.
- Hamner, M.G. (2003). *American Pragmatism: a Religious Genealogy*. Oxford: University Press.
- Hanna, R. (2006). *Kant and the Foundations of Analytic Philosophy*. Oxford: Clarendon Press.
- Hatfield, G. (1990). *The Natural and the Normative. Theories of Spatial Perception from Kant to Helmholtz*. London: MIT Press.
- Hatfield, G. (1993). Helmholtz and Classicism: The Science of Aesthetics and the Aesthetics of Science. In Cahan (Ed.), *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*: 521-558. London: University of California Press.
- Hatfield, G. (2009). *Perception and Cognition*. Oxford: Oxford University Press.
- Hedge, F.H. & Noa, L. (1882). *The Poems of Goethe*. Translated by E.A. Bowring. Boston: S.E. Cassino.
- Hegel, G.W.F. (1998 [1807]). *Phenomenology of Spirit*. Translated by A.V. Miller. Delhi: Shri Jainendra Press.
- Heidelberger, M. (1993). Force, Law and Experiment. The Evolution of Helmholtz's Philosophy of Science. In Cahan (Ed.), *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*: 461-497. London: University of California Press.

- Heidelberger, M. (1994). Helmholtz' Erkenntnis- und Wissenschaftstheorie im Kontext der Philosophie und Naturwissenschaft des 19. Jahrhunderts. In Krüger (Ed.), *Universalgenie Helmholtz*: 168-185. Berlin: Akademie Verlag.
- Heidelberger, M. (1997). Beziehungen zwischen Sinnesphysiologie und Philosophy im 19. Jahrhundert. In Sandkühler (Ed.), *Philosophie und Wissenschaften. Formen und Prozesse ihrer Interaktion*: 37-58. Frankfurt am Main: Peter Lang.
- Heidelberger, M. (1999). Innen und Aussen in der Wahrnehmung. In Breidbach & Clausberg (Eds.), *Video ergo sum*: 147-157. Hamburg: Hans-Bredow-Institut.
- Heidelberger, M. (2005). Freiheit und Wissenschaft! Metaphysische Zumutungen von Verächtern der Willensfreiheit. In Engels & Hildt (Eds.), *Neurowissenschaften und Menschenbild*: 195-219. Paderborn: Mentis.
- Heimann, P.M. (1974). Helmholtz and Kant. Metaphysical Foundations of Über die Erhaltung der Kraft. *Studies in History and Philosophy of Science* 5(3): 205-238.
- Helmholtz, H. (1889 [1847]). *Über die Erhaltung der Kraft*. Leipzig: Verlag von Wilhelm Engelmann.
- Helmholtz, H. (1883 [1851]). Beschreibung einen Augenspiegels zur Untersuchung der Netzhaut im Lebenden Auge. In Helmholtz, *Wissenschaftliche Abhandlungen* (Vol. II): 591-609. Leipzig: J. A. Barth.
- Helmholtz, H. (1883 [1852]). Ueber die Natur der menschlichen Sinnesempfindungen. In Helmholtz, *Wissenschaftliche Abhandlungen* (Vol. II): 591-609. Leipzig: J. A. Barth.
- Helmholtz, H. (1995 [1853]). On Goethe's Scientific Researches. In Cahan (Ed.), *Science and Culture*: 1-17. Chicago: University of Chicago Press.
- Helmholtz, H. (1995 [1854]). On the Interaction of the Natural Forces. In Cahan (Ed.), *Science and Culture*: 18-45. Chicago: University of Chicago Press.
- Helmholtz, H. (1896 [1855]). Ueber das Sehen des Menschen. In Helmholtz, *Vorträge und Reden* (Vol. I): 85-119. Braunschweig: Holzstiche.
- Helmholtz, H. (1995 [1857]). On the Physiological Causes of Harmony in Music. In Cahan (Ed.), *Science and Culture*: 46-75. Chicago: University of Chicago Press.
- Helmholtz, H. (1995 [1862]). On the Relation of Natural Science to Science in General. In Cahan (Ed.), *Science and Culture*: 76 – 95. Chicago: University of Chicago Press.
- Helmholtz, H. (1995 [1862/63]). On the Conservation of Force. In Cahan (Ed.), *Science and Culture*: 96-126. Chicago: University of Chicago Press.
- Helmholtz, H. (1912 [1863]). *On the Sensations of Tone*. Translated by A.J. Ellis. London: Longmans, Green, and Co.
- Helmholtz, H. (1883 [1866]). Ueber die thätlichen Grundlagen der Geometrie. In Helmholtz, *Wissenschaftliche Abhandlungen* (Vol. II): 611-639. Leipzig: J. A. Barth.
- Helmholtz, H. (1977 [1866]). On the Facts Underlying Geometry. In Herz & Schlick (Eds.), *Hermann von Helmholtz. Epistemological Writings*: 72-114. Dordrecht: Reidel.
- Helmholtz, H. (1867 [1856/66]). *Handbuch der Physiologischen Optik* (Published in three volumes). Leipzig: Leopold Voss.
- Helmholtz, H. (1925 [1856/66]). *Helmholtz's Treatise on Physiological Optics* (Published in three volumes). Translated by J. P. C. Southall. Wisconsin: George Banta Publishing Company.
- Helmholtz, H. (1995 [1868]). The Recent Progress of the Theory of Vision. In Cahan (Ed.), *Science and Culture*: 127 – 203. Chicago: University of Chicago Press.
- Helmholtz, H. (1995 [1869]). On the Aim and Progress of Physical Science. In Cahan (Ed.), *Science and Culture*: 204 – 225. Chicago: University of Chicago Press.
- Helmholtz, H. (1995 [1870]). On the Origin and Significance of Geometrical Axioms. In Cahan (Ed.), *Science and Culture*: 226-248. Chicago: University of Chicago Press.
- Helmholtz, H. (1896 [1874]). Ueber das Streben nach Popularisierung der Wissenschaft. In Helmholtz, *Vorträge und Reden* (Vol. II): 213-249. Braunschweig: Holzstiche.
- Helmholtz, H. (1896 [1875]). Ueber Goethe's naturwissenschaftliche Arbeiten, Nachschrift. In Helmholtz, *Vorträge und Reden* (Vol. I): 46-47. Braunschweig: Holzstiche.

- Helmholtz, H. (1896 [1877a]). Das Denken in der Medicin. In Helmholtz, *Vorträge und Reden* (Vol. II): 165-190. Braunschweig: Holzstiche.
- Helmholtz, H. (1995 [1877a]). On Thought in Medicine. In Cahan (ed.), *Science and Culture*: 309-327. Chicago: University of Chicago Press.
- Helmholtz, H. (1995 [1877b]). On Academic Freedom in German Universities. In Cahan (ed.), *Science and Culture*: 328 – 341. Chicago: University of Chicago Press.
- Helmholtz, H. (1883 [1878a]). Ueber den Ursprung und Sinn der geometrischen Sätze; Antwort gegen Herrn Professor Land. In Helmholtz, *Wissenschaftliche Abhandlungen*: 640-660. Leipzig: Johann Ambrosius Barth.
- Helmholtz, H. (1896 [1878b]). Die Thatsachen in der Wahrnehmung. In Helmholtz, *Vorträge und Reden* (Vol. II): 213-249. Braunschweig: Holzstiche.
- Helmholtz, H. (1977 [1878b]). The Facts in Perception. In *Hermann von Helmholtz. Epistemological Writings*. Translated by P. Herz and M. Schlick: 115-185. Dordrecht: Reidel Publishing
- Helmholtz, H. (1995 [1878b]). The Facts in Perception. In Cahan (Ed.), *Science and Culture*: 342 - 380. Chicago: University of Chicago Press.
- Helmholtz, H. (1995 [1891]). Hermann von Helmholtz. An Autobiographical Sketch. In Cahan (Ed.), *Science and Culture*: 381 – 392. Chicago: University of Chicago Press.
- Helmholtz, H. (1995 [1892]). Goethe's Presentiments of Coming Scientific Ideas. In Cahan (Ed.), *Science and Culture*: 393 – 412. Chicago: University of Chicago Press.
- Helmholtz, H. (1894). Über den Ursprung der richtigen Deutung unserer Sinneseindrücke. *Zeitschrift für Psychologie und Physiologie der Sinnesorgane* 7: 81-96.
- Helmholtz, H. (1969 [1894]). The Origin of the Correct Interpretation of our Sensory Impressions. In Warren & Warren (Eds.), *Helmholtz on Perception: Its Physiology and Development*: 247-260. New York: John Wiley & Sons.
- Helmholtz, H. (1896). *Handbuch der Physiologischen Optik* (Zweite umgearbeitete Auflage; Published in three volumes). Hamburg: Leopold Voss.
- Helmholtz, H. (1971). *Philosophische Vorträge und Aufsätze* (Ed. Hörz, H. & Wollgast, S.). Berlin: Akademie Verlag.
- Helmholtz, H. (1977 [1921]). *Epistemological Writings* (Ed. Cohen & Elkana). Dordrecht: D. Reidel.
- Henrich, D. (1982 [1967]). Fichte's Original Insight. *Contemporary German Philosophy* 1: 15-53.
- Hergenhahn, B.R. (2009). *An Introduction to the History of Psychology* (Sixth Edition). California: Wadsworth.
- Heyfelder, V. (1897). *Über den Begriff der Erfahrung bei Helmholtz*. Diss. Berlin.
- Hill Green, T. (1885). Introductions to Hume's 'Treatise of Human Nature'. In Nettleship (Ed.), *Works of Thomas Hill Green* (Vol. I): 1-372. London: Longmans, Green, and Co.
- Hochberg, J. (2007). *In the Mind's Eye* (Ed. Peterson et al.). Oxford: University Press.
- Holmes, F.L. (1994). The Role of Johannes Müller in the Formation of Helmholtz's Physiological Career. In Krüger (Ed.), *Universalgenie Helmholtz*: 3-21. Berlin: Akademie Verlag.
- Holzhey, H. & Mudroch, V. (2005). *The A to Z of Kant and Kantianism*. Plymouth: Scarecrow Press.
- Hörz, H. & Wollgast, S. (1971). *Hermann von Helmholtz, Philosophische Vorträge und Aufsätze*. Berlin: Akademie Verlag.
- Hörz, H. (1995). Schopenhauer und Helmholtz. In Gavroglu et al. (Eds.), *Science, Mind and Art*: 99-122. Amsterdam: Kluwer.
- Hume, D. (1969 [1739/40]). *A Treatise of Human Nature*. London: Penguin Books.
- Hume, D. (1938 [1740]). *An Abstract of a Treatise of Human Nature*. Cambridge: Cambridge University Press.
- Hume, D. (1975 [1748]). *Enquiries Concerning Human Understanding and Concerning the Principles of Morals*. Oxford: Clarendon Press.
- Husserl, E. (1960 [1950]). *Cartesian Mediations*. Boston: Martinus Nijhoff.
- Husserl, E. (1989 [1952]). *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy* (Vol. I). New York: Kluwer Academic.

- Husserl, E. (1970 [1954]). *The Crisis of European Sciences and Transcendental Phenomenology*. Evanston: Northwestern University Press.
- Hyder, D. (1999). Helmholtz's Naturalized Conception of Geometry and his Spatial Theory of Signs. *Philosophy of Science* 66 (3): 273-286.
- Hyder, D. (2006). Kant, Helmholtz and the Determinacy of Physical Theory. In Hendricks et al. (Eds.), *Interactions: Mathematics, Physics and Philosophy from 1860 to 1930*: 1-42. Dordrecht: Kluwer.
- Inukai, Y. (2007). Hume's Labyrinth: The Bundling Problem. *History of Philosophy Quarterly* 24(3): 255-274.
- James, W. (1890). *Principles of Psychology* (Vol. I). London: Macmillan and Co.
- Jeannerod, M. et al. (1979). Corollary Discharge: Its Possible Implications in Visual and Oculomotor Interaction. *Neuropsychologia* 17: 241-258.
- Jeannerod, M. (2006). The Origin of Voluntary Action. History of a Physiological Concept. *Comptes Rendus: Biologies* 329: 354-362.
- Johnson, O.A. (1995). *The Mind of David Hume: A Companion to Book I of A Treatise of Human Nature*. Oxford: Oxford University Press.
- Jones, E.G. (1972). The Development of the 'Muscular Sense' Concept during the Nineteenth Century and the Work of H. Charlton Bastian. *Journal of the History of Medicine and Allied Sciences* 27(3): 298-311.
- Jones, P. (1982). *The Reception of David Hume in Europe*. New York: Thoemmes Continuum.
- Kail, P.J.E. (2007). *Projection and Realism in Hume's Philosophy*. Oxford: Oxford University Press.
- Kant, I. (2004 [1783]). *Prolegomena to Any Future Metaphysics*. Translated by G. Hatfield. Cambridge: Cambridge University Press.
- Kant, I. (2011 [1781/1787]). *Kritik der Reinen Vernunft*. Stuttgart: Suhrkamp.
- Kant, I. (1998 [1781/1787]). *Critique of Pure Reason*. Translated by P. Guyer & A. Wood. Cambridge: Cambridge University Press.
- Kant, I. (2002 [1788]). *Critique of Practical Reason*. Translated by W.S. Pluhar. Indianapolis: Hackett Publishing Company.
- Kant, I. (2006 [1796/97]). *Anthropology from a Pragmatic Point of View*. Translated by R.B. Louden. Cambridge: Cambridge University Press.
- Kant, I. (1991 [1797]). *The Metaphysics of Morals*. Translated by M. Gregor. Cambridge: Cambridge University Press.
- Kant, I. (1993 [1804]). *Opus Postumum*. Translated by P. Guyer & A.W. Wood. Cambridge: Cambridge University Press.
- Kant, I. (1997 [1821]). *Lectures on Metaphysics*. Translated by K. Ameriks. Cambridge: Cambridge University Press.
- Kemp Smith, N. (1923/1962). *A Commentary on Kant's 'Critique of Pure Reason'*. New York: Humanities Press.
- Kemp Smith, N. (1966). *The Philosophy of David Hume*. New York: St Martin's Press.
- Kircher, T.J. & Leube, D.T. (2003). Self-Consciousness, Self-Agency, and Schizophrenia. *Consciousness and Cognition* 12: 656-669.
- Kircher, T.J. & David, A. (2003). *The Self in Neuroscience and Psychiatry*. Cambridge: Cambridge University Press.
- Kitcher, P. (1982). Kant on Self-Identity. *The Philosophical Review* 91(1): 41-72.
- Kitcher, P. (1990). *Kant's Transcendental Psychology*. Oxford: Oxford University Press.
- Kitcher, P. (2011). *Kant's Thinker*. Oxford: Oxford University Press.
- Knight, W. (1990). Romanticism and the Sciences. In Cunningham & Jardine (Eds.), *Romanticism and the Sciences*: 13-24. Cambridge: Cambridge University Press.
- Koenigsberger, L. (1902/03). *Hermann von Helmholtz*. Braunschweig: Verlag von Friedrich Vieweg und Sohn.
- Koenigsberger, L. (1906 [1902/1903]). *Hermann von Helmholtz*. Translated by F.A. Welby. Oxford: Clarendon Press.

- Krause, A. (1878). *Kant und Helmholtz*. Lahr: Moritz Schauenburg.
- Krüger, L. (1994). *Universalgenie Helmholtz*. Berlin: Akademie Verlag.
- Kuhn, H. (1949). Ernst Cassirer's Philosophy of Culture. In Schilpp (Ed.), *The Philosophy of Ernst Cassirer* (5th edition): 545-574. Illinois: Evanston.
- Lafargue, G. & Franck, N. (2009). Effort awareness and Sense of Volition in Schizophrenia. *Consciousness and Cognition* 18: 277-289.
- Land, J.P.N. (1877). Kant's Space and Modern Mathematics. *Mind* 2(5): 38-46.
- Lang, H. (1987). Color Vision Theories in Nineteenth Century Germany Between Idealism and Empiricism. *Color Research and Application* 12(5): 270-281.
- Lange, F.A. (1881 [1866]). *History of Materialism* (Vol. III). Translated by E.C. Thomas. London: Trübner & Co.
- Legrand, D. (2007). Pre-reflective Self-as-Subject from Experiential and Empirical Perspectives. *Consciousness and Cognition* 16: 583-599.
- Leibniz, G.W. (2004 [1695]). Clarification of the 'New System of the Nature of the Communication of Substances'. In Strickland (Ed.), *The Shorter Leibniz Texts*: 77-78. New York: Continuum.
- Leidlmaier, K. (2009). *After Cognitivism*. New York: Springer.
- Lenin, W.I. (1971 [1925]). *Materialismus und Empirio-kritizismus*. Berlin: Dietz Verlag.
- Lenoir, T. (1982). *The Strategy of Life*. Chicago: University of Chicago Press.
- Lenoir, T. (1993). The Eye as a Mathematician. In Cahan (Ed.), *Hermann von Helmholtz and the Foundations of Nineteenth-Century science*: 109-153. London: University of California Press.
- Lenoir, T. (1997). *Instituting Science*. Stanford: University Press.
- Lenoir, T. (2006). Operationalizing Kant: Manifolds, Models, and Mathematics in Helmholtz's Theories of Perception. In Friedman & Nordmann (Eds.), *The Kantian Legacy in Nineteenth-Century Science*: 141-210. Cambridge: MIT Press.
- Leroux, J. (1997). Helmholtz and Modern Empiricism. *Québec Studies in the Philosophy of Science* 177: 287-296.
- Liebert, A. (1920). *Das Problem der Geltung*. Leipzig: Felix Meiner.
- Liebmann, O. (1869). *Ueber den objectiven Anblick*. Stuttgart: Carl Schober.
- Liebmann, O. (1911). *Zur Analysis der Wirklichkeit*. Strassburg: K. F. Trübner.
- Lloyd, G. (1993). *Being in Time*. New York: Routledge.
- Locke, J. (1836 [1690]). *An Essay Concerning Human Understanding* (27th edition). London: T. Tegg and Son.
- Lopez-Dominguez, V. (2010). Body and Intersubjectivity: The Doctrine of Science and Husserl's Cartesian Mediations. In Waibel et al. (Eds.), *Fichte and the Phenomenological Tradition*: 191-206. New York: De Gruyter.
- Lumsden, S. (2004). Fichte's Striving Subject. *Inquiry* 47: 123-142.
- Mach, E. (1886). *Beiträge zur Analyse der Empfindungen*. Jena: Verlag von Gustav Fischer.
- Mahner, M. (2011). The Role of Metaphysical Naturalism in Science. *Science and Education* 21: 1437-1459.
- Makari, G. (1994). In the Eye of the Beholder: Helmholtzian Perception and the Origin of Freud 1900 theory of Transference. *Journal of the American Psychoanalytic Association* 42 (2): 549-580.
- Makari, G. (2008). *Revolution in the Mind*. New York: Harper Collins Publishing.
- Makkreel, R.A. & Luft, S. (2010). *Neo-Kantianism in Contemporary Philosophy*. Indiana: Indiana University Press.
- Maleuvre, D. (2011). *The Horizon. A History of Our Infinite Longing*. Los Angeles: University of California Press.
- Marshall, C. (2010). Kant's Metaphysics of the Self. *Philosophers' Imprint* 10(8): 1-21.
- Martin, R. & Barresi, J. (2006). *The Rise and Fall of Soul and Self*. New York: Columbia University Press.

- Martin, W. (2006). Fichte's Transcendental Phenomenology of Agency. In Merle & Smith (Eds.), *Fichte: System der Sittenlehre*. Berlin: Akademie Verlag.
- Mayr, E. (1997). *This is Biology*. Harvard: Harvard University Press.
- McCarty, D. C. (2000). Optics of Thought: Logic and Vision in Müller, Helmholtz and Frege. *Notre Dame Journal of Formal Logic* 41(4): 365-378.
- McDonald, P.J. (2003). Demonstration by Simulation: the Philosophical Significance of Experiment in Helmholtz's Theory of Perception. *Perspectives on Science* 11(2): 170-207.
- McDonald, P.J. (2008). Naturalistic Methodology in an Emerging Scientific Psychology: Lotze and Fechner in the Balance. *Zygon* 43(3): 605-625.
- McIntyre, J.L. (1994). Hume: Second Newton of the Moral Sciences. *Hume Studies* 20(1): 1-18.
- Merleau-Ponty, M. (1962 [1945]). *Phenomenology of Perception*. London: Routledge.
- Meulders, M. (2010). *Helmholtz. From Enlightenment to Neuroscience*. Cambridge: MIT Press.
- Mill, J.S. (1878 [1865]). *An Examination of Sir William Hamilton's Philosophy (5th edition)*. London: Longmans, Green, Reader & Dyer.
- Mill (1867 [1859]). Bain's Psychology. In Mill, *Dissertations and Discussions* (Vol. III): 97-152. London: Longmans.
- Mill, J.S. (1882 [1843]). *A System of Logic* (8th edition). New York: Harper & Brothers.
- Müller, J.S. (1826). *Zur vergleichenden Physiologie des Gesichtssinnes*. Leipzig: Gnobloch.
- Müller, J.S. (1842 [1833/1840]). *Elements of Physiology* (Vol. II). Translated by W. Baly. London: Taylor and Walton.
- Myin, E. & O'Regan, J.K. (2002). Perceptual Consciousness, Access to Modality, and Skill Theories: A Way to Naturalize Phenomenology? *Journal of Consciousness Studies* 9: 27-46.
- Natorp, P. (1888). *Einleitung in die Psychologie nach kritischer Methode*. Freiburg: J.C.B. Mohr.
- Neuber, M. (2012). Helmholtz's Theory of Space and its Significance for Schlick. *British Journal for the History of Philosophy* 20(1): 163-180.
- Neuhouser, F. (1990). *Fichte's Theory of Subjectivity*. Cambridge: University Press.
- Noë, A. (2004). *Action in Perception*. Cambridge: MIT Press.
- Norsell, U. et al. (1999). Cutaneous Sensory Spots and the "Law of Specific Nerve Energies": History and Development of Ideas. *Brain Research Bulletin* 48(5): 457-465.
- Olesko, K.M. & Holmes F.L. (1993) Experiment, Quantification and Discovery. Helmholtz's Early Physiological Researches (1843-1850). In Cahan (Ed.) *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*: 50-108. London: University of California Press.
- Ollig, H. L. (1979). *Der Neukantianismus*. Stuttgart: J.B. Metzlersche Verlagsbuchhandlung.
- Otis, L. (2007). *Müller's Lab*. Oxford: University Press.
- Pachoud, B. (1999). The Teleological Dimension of Perceptual and Motor Intentionality. In Petitot et al. (Eds.), *Naturalizing Phenomenology*: 196-219. Stanford: Stanford University Press.
- Pastore, N. (1971). *Selective History of Theories of Visual Perception: 1650-1950*. New York: Oxford University Press.
- Pastore, N. (1978). Helmholtz on the Projection or Transfer of Sensation. In Machamer et al. (Eds.), *Studies in Perception*: 355-376. Ohio: Ohio State University Press.
- Pastore, N. (1993). The "Inside-Outside Problem" and Wolfgang Köhler. *Advances in Psychology* 99: 221-230.
- Patten, S.C. (1976). Hume's Bundles, Self-Consciousness and Kant. *Hume Studies* 2(2): 59-75.
- Patton, L. (2009). Signs, Toy Models, and the A Priori. *Studies in History and Philosophy of Science* 40(3): 281-289.
- Pears, D. (1993). Hume on Personal Identity. *Hume Studies* 19(2): 289-300.
- Phillipps, F.L.M. (1866). *The Battle of the Two Philosophies*. London: Spottiswoode and Co.
- Pinkard, T. (2002). *German Philosophy*. Cambridge: Cambridge University Press.
- Pippin, R.B. (1991). Idealism and Agency in Kant and Hegel. *The Journal of Philosophy* 88(10): 532-541.

- Poe, H.L. & Mytyk, C. R. (2007). From Scientific Method to Methodological Naturalism: The Evolution of an Idea. *Perspectives on Science and Christian Faith* 59(3): 213-218.
- Post, K. (1905). *Johannes Müllers Philosophische Anschauungen*. Tübingen: Max Niemeyer.
- Posy, C. (2003). Between Leibniz and Mill: Kant's Logic and the Rhetoric of Psychologism. In Jacquette (Ed.), *Philosophy, Psychology and Psychologism*: 51-80. New York: Kluwer.
- Powell, C.T. (1990). *Kant's Theory of Self-Consciousness*. Oxford: Clarendon Press.
- Purkinje, J.E. (1823 [1819]). *Sebrané, spisy* (Vol. 1). Prague: Vetterl.
- Rachlin, H. (2005). What Müller's Law of Specific Nerve Energies Says about the Mind. *Behavior and Philosophy* 33: 41-54.
- Redner, H. (1982). *In the Beginning was the Deed. Reflections on the Passage of Faust*. Berkeley: University of California Press.
- Reid, T. (1852). Letters. In Hamilton (Ed.), *The Works of Thomas Reid* (3rd Edition): 39-94. Edinburgh: Maclachlan and Stewart.
- Reid, T. (1852 [1764]). Inquiry into the Human Mind. In Hamilton (Ed.), *The Works of Thomas Reid* (3rd Edition): 95-214. Edinburgh: Maclachlan and Stewart.
- Reid, T. (1852 [1785]). Essays on the Intellectual Powers of Man. In Hamilton (Ed.), *The Works of Thomas Reid* (3rd Edition): 215-510. Edinburgh: Maclachlan and Stewart.
- Reid, T. (1852 [1788]). Essays on the Active Powers of the Human Mind. In Hamilton (Ed.), *The Works of Thomas Reid* (3rd Edition): 511-680. Edinburgh: Maclachlan and Stewart.
- Reinhold, K.L. (2003 [1790]). *Beiträge zur Berichtigung bisheriger Missverständnisse der Philosophen, Erster Band*. Hamburg: Felix Meiner.
- Rieber, W.R. & Robinson, D.K. (2001). *Wilhelm Wundt in History*. New York: Kluwer Academic.
- Riehl, A. (1904). Helmholtz in seinem Verhältnis zu Kant. *Kant Studien* 9(1): 261-285.
- Roberts, T. (2010). Understanding 'Sensorimotor Understanding'. *Phenomenology and the Cognitive Sciences* 9: 101-111.
- Robinson, D.N. (1986). *An Intellectual History of Psychology*. Wisconsin: University of Wisconsin Press.
- Rocknak, S. (2013). *Imagined Causes: Hume's Conception of Objects*. Dordrecht: Springer.
- Rorty, R. (1979). *Philosophy and the Mirror of Nature*. Princeton: Princeton University Press.
- Roth, A.S. (2000). What was Hume's Problem with Personal Identity? *Philosophy and Phenomenological Research* 61(1): 91-114.
- Rowlands, M. (2004). *The Body in Mind*. Cambridge: Cambridge University Press.
- Ryan, R.S. (1974). *J.S. Mill*. London: Routledge.
- Russell, B. (2003 [1986]). *The Collected Papers of Bertrand Russell* (Vol. 8). London: Routledge.
- Russel, B. (1897). *An Essay on the Foundations of Geometry*. Cambridge: University Press.
- Sandkaulen, B. (2007). Das "Leidige Ding an sich." Kant-Jacobi-Fichte. In Stolzenberg (Ed.), *Kand und der Frühidealismus*: 175-202. Hamburg: Felix Meiner.
- Sass, L.A. & Parnas, J. (2003). Schizophrenia, Consciousness, and the Self. *Schizophrenia Bulletin* 29(3): 427-444.
- Scarre, G. (1989). *Logic and Reality in the Philosophy of John Stuart Mill*. Dordrecht: Kluwer.
- Scheerer, E. (1989). On the Will: A Historical Perspective. *Advances in Psychology*, 62: 39 - 60. Amsterdam: Elsevier.
- Schiemann, G. (2009). *Hermann von Helmholtz's Mechanism: the Loss of Certainty*. New York: Springer Verlag.
- Schmidgen, H. (2003). Wundt as Chemist? A Fresh Look at his Practice and Theory of Experimentation. *American Journal of Psychology* 116 (3): 469 - 476.
- Schmitz, H. (1996). *Physiologischer Neukantianismus und Evolutionäre Erkenntnistheorie*. Berlin: Peter Lang.
- Schnädelbach, H. (1984). *Philosophy in Germany. 1831-1933*. Cambridge: University Press.
- Schopenhauer, A. (1986 [1813]). Über die Vierfache Wurzel des Satzes vom Zureichenden Grunde. In Schopenhauer, *Kleinere Schriften*: 5-177. Stuttgart: Suhrkamp.

- Schopenhauer, A. (1986 [1816]). Über das Sehn und die Farben. In Schopenhauer, *Kleinere Schriften*: 191-297. Stuttgart: Suhrkamp.
- Schulting, D. & Verburgt, J. (2010). *Kant's Idealism*. Amsterdam: Springer.
- Schulz, R. (2004). *Naturwissenschaftshermeneutik*. Würzburg: Königshausen & Neumann.
- Schulze (1911 [1792]). *Aenesidemus*. Berlin: Verlag von Reuther & Reichard.
- Schwertschlagel, J. (1883). *Kant und Helmholtz*. Freiburg: Herder'sche Verlagshandlung.
- Seamon, D. & Zajonc, A. (1998). *Goethe's Way of Science*. New York: State University of New York Press.
- Sellars, W. (1963). *Science, Perception and Reality*. London: Routledge.
- Sepper, D.L. (1988). *Goethe contra Newton*. Cambridge: Cambridge University Press.
- Shoemaker, S. (1968). Self-Reference and Self-Awareness. *The Journal of Philosophy* 65(19): 555-567.
- Singer, I. (2000). Nature Breaks Down: Hume's Problematic Naturalism in *Treatise I iv*. *Hume Studies* 26(2): 225-243.
- Singh, A.K. (1991). *The Comprehensive History of Psychology*. Delhi: Motilal Banarsidass Publishers.
- Smith, A.D. (2002). *The Problem of Perception*. Cambridge: Harvard University Press.
- Smith, R. (2011). The Sixth Sense: Towards a History of Muscular Sensation. *Gesnerus* 68(1): 218-71.
- Snyder, L. (2006). *Reforming Philosophy*. Chicago: University of Chicago Press.
- Skidelsky, E. (2008). *Ernst Cassirer*. Oxford: Princeton University Press.
- Steege, B. (2012). *Helmholtz and the Modern Listener*. Cambridge: Cambridge University Press.
- Stevenson, M.R. (2012). *Subjectivity and Selfhood in Kant, Fichte and Heidegger*. Doctoral Dissertation: Columbia University.
- Stirling, J.H. (1865). *Sir William Hamilton: The Philosophy of Perception. An Analysis*. London: Longmans, Green, and Co.
- Strawson, P.F. (2008 [1975]). *Scepticism and Naturalism*. London: Routledge.
- Strawson, G. (2011). *The Evident Connexion*. Oxford: Oxford University Press.
- Stroud, B. (1977). *Hume*. London: Routledge.
- Stroud, B. (2006). The Constraints of Hume's Naturalism. *Synthese* 152: 339-351.
- Sturma, D. (2000). The Nature of Subjectivity: The Critical and Systematic Function of Schelling's Philosophy of Nature. In Sedgwick (Ed.), *The Reception of Kant's Critical Philosophy*: 216-231. Cambridge: Cambridge University Press.
- Stumpf, C. (1895). Hermann von Helmholtz and the New Psychology. *Psychological Review* 2(1): 1-12.
- Synofzik et al. (2008a). I move, therefore I am: A new Theoretical Framework to Investigate Agency and Ownership. *Consciousness and Cognition* 17: 411-424.
- Synofzik et al. (2008b). Beyond the Comparator Model: A Multifactorial Two-Step Account of Agency. *Consciousness and Cognition* 17: 219-239.
- Teo, T. (2002). Friedrich Albert Lange on Neo-Kantianism, Socialist Darwinism and a Psychology Without a Soul. *Journal of History of the Behavioral Sciences* 38(3): 285-301.
- Thomas-Fogiel, I. (2005). *The Death of Philosophy*. New York: Columbia University Press.
- Thompson, E. (2005). Sensorimotor Subjectivity and the Enactive Approach to Experience. *Phenomenology and the Cognitive Sciences* 4: 407-427.
- Turner, R. S. (1977). Hermann von Helmholtz and the Empiricist Vision. *Journal of the History of the Behavioral Sciences* 13: 48-58.
- Turner, R.S. (1982). Helmholtz, Sensory Physiology and the Disciplinary Development of German Psychology. In Woodward & Ash (Eds.), *The Problematic Science: Psychology in the Nineteenth Century*: 147-166. New York: Praeger.
- Turner, R.S. (1993). Vision Studies in Germany: Helmholtz versus Hering. *Osiris* 8: 80-103.
- Turner, R.S. (1994). *In the Eye's Mind*. Princeton: Princeton University Press.

- Van Hoorn, W. & Verhave, T. (1980). Wundt's Changing Conceptions of a General and Theoretical Psychology. In Bringmann & Tweney (Eds.), *Wundt Studies*: 71-113. Toronto: Hogrefe.
- Von Holst, E. & Mittelstaedt, H. (1971 [1950]). The Principle of Reafference: Interactions Between the Central Nervous System and the Peripheral Organs. In Dodwell, P.C., *Perceptual Processing: Stimulus Equivalence and Pattern Recognition*: 41-72. New York: Meredith Corporation.
- Voss et al. (2010). Altered Awareness of Action in Schizophrenia: A Specific Deficit in Predicting Action Consequences. *Brain* 133(10): 3104-3112.
- Wade, N.J. & Brožek, J. (2001). *Purkinje's Vision: The Dawning of Neuroscience*. Philadelphia: Taylor & Francis.
- Waxman, W. (1992). Hume's Quandary Concerning Personal Identity. *Hume Studies* 18(2): 233-253.
- Waxman, W. (1994). *Hume's Theory of Consciousness*. Cambridge: Cambridge University Press.
- Wegener, D. (2009). Science and Internationalism in Germany: Helmholtz, Du Bois-Reymond and Their Critics. *Centaurus* 51: 265-287.
- Westheimer, G. (2008). Was Helmholtz a Bayesian? *Perception* 37(5): 642-650.
- Westphal, K.R. (1997). Noumenal Causality Reconsidered: Affection, Agency, and Meaning in Kant. *Canadian Journal of Philosophy* 27(2): 209-245.
- Wise, M.N. (1983). On the Relation of Physical Science to History in Late Nineteenth-Century Germany. In Graham, Lepenies and Weingard (Eds.), *Functions and Uses of Disciplinary Histories*: 3-34. Dordrecht: Reidel Publishing.
- Wood, P.B. (1986). David Hume on Thomas Reid's An Inquiry into the Human Mind. *Mind* 95(380): 411-416.
- Wood, A.W. (2000). The "I" as Principle of Practical Philosophy. In Sedgwick (Ed.), *The Reception of Kant's Critical Philosophy*: 93-108. Cambridge: Cambridge University Press.
- Wundt, W. (1882). Die Aufgaben der experimentellen Psychologie. *Unsere Zeit* 3: 389-406.
- Wundt, W. (1897 [1896]). *Outlines of Psychology*. Translated by C.H. Judd. Leipzig: W. Engelmann.
- Zahavi, D. (2003). Phenomenology of Self. In Kircher & David (Eds.), *The Self in Neuroscience and Psychiatry*: 56-75. Cambridge: Cambridge University Press.
- Zöllner, G. (1999). Schopenhauer on the Self. In Janaway (Ed.), *The Cambridge Companion to Schopenhauer*: 18-43. Cambridge: Cambridge University Press.
- Zöllner, G. (2000). From *Critique* to *Metacritique* : Fichte's Transformation of Kant's Transcendental idealism. In Sedgwick (Ed.), *The Reception of Kant's Critical Philosophy*: 129-146. Cambridge: Cambridge University Press.
- Zöllner, G. (2007). From Transcendental Philosophy to *Wissenschaftslehre*: Fichte's Modification of Kant's idealism. *European Journal of Philosophy* 15(2): 249-269.
- Zöllner, J.C.F. (1872). *Über die Natur der Cometen*. Leipzig: Verlag von Wilhelm Engelmann.

