

# The Philosophical Psychology of Charles S. Peirce

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Submitted for the degree of: Doctor in Philosophy

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I, Claudia Cristalli, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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To my parents, my first sponsors,  
and to my sister Flavia.

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# Abstract

This work is about the philosophy of Charles Sanders Peirce (1839-1914) and nineteenth century psychology. More precisely, it is about the interactions between Peirce's scientific practice as an experimental psychologist and the development of his philosophical reflection, especially his epistemology. The main thesis of this work is that Peirce's theory of perception is inferential, and that this has far-reaching consequences on his account of the self, on his reflection on the method of science and on what counts as a scientific fact. This latter point also connects his theory of inquiry with his distinctive metaphysics of continuity.

I defend my thesis as follows. In the first chapter, I explore the early development of an inferential account of perception in Peirce and its connections with his logic of science and his theory of inquiry more broadly. To do so, I examine Peirce's 1865 Harvard Lectures in light of the inferential philosophy of science of William Whewell and the theory of perception as unconscious inferences presented by Wilhelm Wundt in 1862-3. In the second chapter, I bring Peirce's inferentialism to bear on some of his better-known works: the 1868 "cognition" papers and the *Illustrations of the Logic of Science* of 1877-8. The third chapter further expands the context of Peirce's inferential theory of perception by looking at German psychology and finding a new perspective from which to assess Kant's influence on Peirce's thought. Chapter 4 looks at Peirce's use of experimental psychology in photometry and measurement techniques developed for astronomy in psychology. Chapter 5 engages with Peirce's "boundary work" on science by comparing his engagement with psychical research with James' and looking at Peirce's metaphysics in relation to evolutionary psychology. Finally, Chapter 6 assesses Peirce's "mature" theory of perception in light of psychical research and his metaphysics of continuity.

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# Impact statement

This work constitutes the first systematic exploration of the philosophical psychology of Charles Sanders Peirce. Situated at the intersection of history and philosophy of science, it successfully engaged scholars of both fields as well as the diverse community of pragmatist scholars. My approach to Peirce's philosophy is historical, in that I aim at reconstructing his thought in its own terms; however, it is not internalist, which means that I do not attempt such reconstruction in light of his texts alone. In fact, the original contribution of my work lies precisely in the way in which I bring the history of psychology and of nineteenth-century philosophy to bear on long-disputed questions within Peirce scholarship. Because of these features, my work speaks to scholars from a variety of backgrounds, ranging from specialists in other classical pragmatist figures to historians of science and contemporary semioticians. Venues where I presented my work include the Pragma conference, Termoli, July 2019; European Society for the History of Science conference, London, June 2018; History of Philosophy of Science conference, Groningen, July 2018; European Pragmatism Conference, Helsinki, June 2018; and the International Association for Cognitive Semiotics, Lublin, May 2016. I was an invited speaker at the British Society for the History of Mathematics Christmas Conference (Birmingham, December 2018), where I presented a paper on mathematical continuity and the stream of consciousness to a public of mathematicians and historians of mathematics. In 2017, I published my first contribution on Peirce's experimental psychology in the *European Journal of Pragmatism and American Philosophy*. However, the impact of my work reaches beyond Academia, and it is this latter outcome of my studies which I find more rewarding. During the years that I spent in London, I had the opportunity to use my philosophical expertise and the knowledge of topics in the history of psychology and philosophy of science to meaningfully engage with participants of the "Stuart Low Trust Philosophy Forum" (<https://www.slt.org.uk/philosophy-forum>). The Forum runs weekly sessions on Sundays afternoons and I participated regularly both as a presenter and as a facilitator from 2016 to the Summer of 2019; since Fall 2019, my commitment decreased but I still facilitated many sessions and, as the Covid-19 pandemic forced us to go online, I presented on nineteenth century psychical research for the first Zoom session of the year (5<sup>th</sup> of April,

2020). All sessions have feedback forms to allow participants to express their evaluation of the session (relevance of the topic presented, quality of the discussion, incidents to report). The reports are for internal use only but they effectively document the need for philosophical conversations and their impact on the well-being of everyone involved. Finally, I would like to stress that these sessions also had a great impact on my own research and my attitude as a scholar. No real impact is one-sided, and what I gained from this activity in terms of human and professional growth greatly surpasses the efforts I put in participating to it.

# Acknowledgements

In developing this work, I benefited from the collaboration and interest of many people. At the Science and Technology Department, UCL, I found a diverse intellectual community which constantly challenged me to go beyond pure philosophy, an attitude which I now recognise as most philosophical. In particular, I wish to thank kat cecil, who listened to many versions of my work and emboldened me in my social beliefs; Edward Bankes, Benjamin Weil, Farrah Lawrence, and Becky Martin for always stimulating readings and conversations. From the philosophy crew, thanks to Erman Sozudogru for dragging me to the Philosophy of Science reading group in my first year; to Rory Jubber, Toby Friend and Elena Falco, for having formed – at different times – the backbone of that very group. Very special thanks go to Julia Sanchez-Dorado, whom I admire as a philosopher and cherish as a friend.

Significant philosophical contributions from outside the department came from Luca Timponelli and Silvia de Bianchi, with whom I had helpful Kantian conversations; Michela Bella, who opened my eyes to the riches of William James and who is a model of constructive, non-confrontational philosophical discussion; Sebastian Gardner, who gave precious feedback on earlier stages of this work and fuelled my love for German nineteenth-century philosophy and *Naturphilosophie*; and the pragmatist community at large, that makes each pragmatist feel less lonely at least once a year. Special thanks for their ongoing support to Francesco Bellucci, Ahti-Veikko Pietarinen, Rossella Fabbrichesi, Gabriele Gava, Giovanni Maddalena, and Rosa Maria Calcaterra.

Chiara Ambrosio and Mats Bergman, primary and secondary supervisor respectively, were invaluable intellectual and human guides. Although all responsibility for any mistakes remains mine, much of the worth that this work may possess is also the result of their tireless efforts and advice. Bergman pushed me to adopt a chronologic and systematic approach to the topic, while Ambrosio showed me the ropes of integrated history and philosophy of science and prodded me to thoroughly engage with psychical research alongside history of experimental psychology.

Thanks to the Stuart Low Trust Philosophy Forum for showing me the relevance of philosophy outside academia. In particular, I wish to thank Alun David, for the keen interest in my work and his precious comments on drafts of Chapters 5 and 6. Thanks to

Dominic Berry for comments on a draft Chapter 1, and to Jono Spring for having made it halfway through my Chapter 2. Thanks to my dad for having discussed the translation of some awkward German sentences with me and to my mum for methodological discussions and endless support. Grzegorz Kowalik listened to different versions of my Introduction for several hours. This however is only a fraction of the patience that he showed me in the final stages of this work. Thank you.

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# List of Abbreviations

- EP 2      *The Essential Peirce. Selected Philosophical Writings. Vol. 2 (1893-1913).*  
Edited by the Peirce Edition Project (Bloomington: Indiana University Press, 1998).
- CP      *Collected Papers of Charles S. Peirce*, 8 vols. Edited by C. Hartshorne, P. Weiss, and A. Burks (Cambridge: Harvard University Press, 1932-1958).
- NEM      *The New Elements of Mathematics by Charles S. Peirce*, 4 vols. Edited by C. Eisele (The Hague: Mouton, 1976).
- R      Harvard Manuscript (MS): Charles S. Peirce Papers, 1787-1951, MS Am 1632, Houghton Library, Harvard University. As listed in Richard Robin, *Annotated Catalogue of the Papers of Charles S. Peirce*, (Amherst: University of Massachusetts Press, 1967).
- W      *Writings of Charles S. Peirce: A Chronological Edition*, 7 vols. (1-6, 8). Edited by E. Moore, C. J. W. Kloesel et al. (Bloomington: Indiana University Press, 1982-2009).
- \*\*\*
- AA      *Akademieausgabe von Immanuel Kant. Kants Gesammelte Schriften.* (Berlin: Walter de Gruyter & Co., 1968). Available from <https://korpora.zim.uni-duisburg-essen.de/Kant/verzeichnisse-gesamt.html>.
- \*\*\*
- CWJSM      *Collected Works of John Stuart Mill*, 33 vols. Ed. by John M. Robson, Toronto and Buffalo: University of Toronto Press; London: Routledge & Kegan Paul, 1963.
- \*\*\*
- James W      *Writings of William James*, 2 vols. Edited by Gerald E. Myers (New York: Literary Classics of the United States, Inc., 1992).

# Translation note

When not explicitly stated, all translations are mine. The original text has been reported in footnotes or square brackets in text (e.g. essay titles).



# Introduction

...all the operations of the soul take place according to one general formula  
which applies to reasoning and instinctive action alike.  
Peirce, MS. 692, 1901.

This work is about the philosophy of Charles Sanders Peirce (1839-1914) and nineteenth century psychology. More precisely, it is about the interactions between Peirce's scientific practice as an experimental psychologist and the development of his philosophical reflection, especially his epistemology. The main thesis of this work is that Peirce's theory of perception is inferential, and that this has far-reaching consequences on his account of the self, on his reflection on the method of science and on what counts as a scientific fact. This latter point also connects his theory of inquiry with his distinctive metaphysics of continuity.

With "inferential perception" I mean a theory that envisages sensations as the result of an unconscious inference, in which the stimuli coming from our senses are collated and organised in a meaningful whole. Unconscious inferences resemble conscious inferences in everything but their being subject to self-control. The opposite of inferential perception is the theory of immediate perception, according to which sensations are "givens" and first elements of knowledge. In the course of this work, I illustrate the notion of inferential perception by situating it in the context of nineteenth-century research. In particular, I give special relevance to the contributions of William Whewell (1794-1866), Wilhelm Wundt (1832-1920), and William James (1842-1910).

Peirce defined himself as "first and foremost, a logician" (Bellucci 2018: 1) and, in a somehow derogatory way,<sup>1</sup> as a "scientific specialist" (W4: 380). He graduated in chemistry at Lawrence Scientific School (Harvard) in 1863. Concomitantly with the start of his degree in 1861, Peirce was also appointed regular aide in the United States Coast

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<sup>1</sup> The title of "scientific specialist" is somehow derogatory because (1) Peirce recognised the possibility that repetitive laboratory work may in fact foster narrow-mindedness; moreover, (2) Peirce maintained that the scientific specialist would not attain "the higher places in science," which are reserved instead "for those who succeed in adapting the methods of one science to the investigation of another." (W4: 380).

Survey,<sup>2</sup> where he had been working as a temporary aide since 1859. In 1869, he became assistant at the Harvard Observatory, where he compiled a new catalogue of stars according to their luminosity (his *Photometric Researches*, 1878). His astronomical research also relied on (and further stimulated) research in the physiology and psychology of perception, especially colour perception. In 1875 “Peirce received two grants [...], one to study color (\$1,200) and another to compare sensations (\$500)” (W3: 524). All along, his appointment at the U.S. Coast Survey continued, and he was promoted to “Assistant” in the same year (1875). Peirce’s intense career culminated in 1879 with the appointment as lecturer in logic at Johns Hopkins University, the first doctoral school in the United States. Besides editing the volume *Studies in Logic* in 1883, Peirce also published with Joseph Jastrow a paper in experimental psychology, “On Small Differences of Sensation” (1885). In spite of all these achievements, Peirce did not get a permanent contract at Johns Hopkins (the chair of philosophy to which he was applying went to Stanley Hall) and his temporary contract was not renewed. From that moment on, Peirce’s professional career suffered a series of setbacks. In 1891 he resigned from the Coast and Geodetic Survey<sup>3</sup> and was never able to gain a permanent position again. From 1896 to 1902, he worked as a consulting chemical engineer but failed to patent his inventions. In the last period of his life, he struggled from economic hardship and from the disappointment of not having realised the “community of inquirers” he envisioned in his philosophy. In spite of the overwork of the first half of his life and the lack of paid work in the second half, he never abandoned his interests in logic and psychology.<sup>4</sup>

What emerges from this biographical sketch is that Peirce was a man of many sciences. This recognition was marked from the beginning of Peirce’s scholarship by two important collected volumes on Peirce and the philosophy of science: *Essays in the Philosophy of Science* edited by Vincent Thomas (1957) and *Charles S. Peirce and the*

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<sup>2</sup> Under the guidance of Benjamin Peirce, Charles’ father, the U.S. Coast Survey started to be involved in international geodesy projects; finally, “Patterson [then head of the institution] in 1878 obtained an act of Congress changing the Survey’s name to: The Coast and Geodetic Survey” (W3: xxviii).

<sup>3</sup> See footnote 2 for the name change of this institution.

<sup>4</sup> I have drawn this biographical sketch from the Chronology of Peirce’s life and works in W4. Joseph Brent’s (1993) biography of Peirce is at the moment the only complete biographical work on Peirce.

*Philosophy of Science* edited by Edward C. Moore (1993). A distinct strand of scholarship on Peirce's scientific works was initiated by Carolyn Eisele, particularly through her edition of Peirce's mathematical works in the *New Elements of Mathematics* (1976; see also Martin's (1979) edited collection of Eisele's essays on Peirce's scientific works). Hilary Putnam's (1992) preface to Peirce's 1898 lectures *Reasoning and the Logic of Things* gave a fundamental contribution to the understanding of Peirce's theory of continuity from a mathematical standpoint. Besides pure mathematics, Victor Lenzen's (1969) study of Peirce's contributions to metrology described in detail his relevance for issues of measurement in the physical sciences. More recently, Peirce's work for the US Coast and Geodetic Survey received attention in contemporary history and philosophy of science. Lorraine Daston and Peter Galison (2009), for instance, contextualise Peirce and the Survey within the broader efforts at coordinating measurement in the physical sciences at the end of the nineteenth century, while Henry Cowels (2016) places Peirce in dialogue with Whewell as two key figures in what he defines as "The Age of Methods" (Cowels 2016: 722-737). In addition to Peirce's work at the Survey, scholars engage with the influence of other special sciences on the development of his philosophy: thus, Aud-Sissel Hoel (2016) considers Peirce's work as an astronomer, Christopher J. Campbell (2017) produced the first systematic analysis of Peirce's engagement with chemistry (particularly the periodic table), and Chiara Ambrosio (2016) looks at the epistemology and material culture of composite photographs. Finally, Ian Hacking's work on probability (1988; 1990) emphasizes how mathematics was part and parcel also of experimental psychology. My work contributes to this literature by disclosing a new angle on the relations between pragmatism and the history and philosophy of science, with special focus on the development of psychology as a science.

Although Thomas Cadwallader (1974: 291-8) explicitly recognised Peirce as the "first American experimental Psychologist", no systematic treatment of his engagement with psychology exists in the literature. Instead, scholars have mainly focused on the semiotic and phenomenological aspects of his account of perception, his position in the psychologism debate, and more recently his reception of, and relation to, the philosophical psychology of his lifelong friend and Harvard psychologist William James. Vincent Colapietro, for example, firstly drew attention in a systematic way to the implications of Peirce's theory of perception for his notion of the self (Colapietro 1992), and further contributed to the debate on psychology and psychologism (Colapietro 2003).

Richard K. Atkins (2018) provides a systematic reconstruction of Peirce's theory of perception in light of his phenomenology, while Mathias Girel's (2003) contribution focuses on the debate between Peirce and William James on the notion of stream of consciousness. Michela Bella's (2019) study on William James and the ontology of continuity also enables a better understanding of the points of contact (and of disagreement) between Peirce's philosophy and James'. My work is not a systematic confrontation between Peirce's thought and James'; nonetheless, I inevitably bring James' ideas into my discussion (in Chapters 2, 5, and 6) in order to highlight the "intellectualism" of Peirce's approach to perception. Other studies of Peirce's account of perception, such as those contained in Kathleen A. Hull and Richard K. Atkins (eds., 2017) and the recent study by Justin Humphreys (2019) on subconscious inferences, deal with Peirce's account of perception from a philosophical point of view only. My original contribution to this debate lies in the integration between the scientific and experimental context of nineteenth century psychology and the philosophical analysis of Peirce's unconscious inferences.

This work is divided in 6 chapters. In the first chapter, I introduce Peirce's inferential theory of perception (which I refer to as inferentialism<sup>5</sup>), showing how it is rooted in the philosophy of science of William Whewell on the one hand and the early philosophical psychology of Wilhelm Wundt on the other. Whewell's philosophy of science, which put induction and the process of discovery at its centre, was a major source of inspiration for Peirce and Wundt alike. Wundt borrowed from Whewell the notion of "colligation," a specific interpretation of how hypotheses are made, to stress certain aspects of his inferential theory of perception. Whewell's influence on Wundt had already been noticed by Wundt scholars (Araujo 2016; Roberts 1980); my contribution lies in bringing this connection to light in the context of Peirce's psychological sources and their relation to his early epistemology.

This intermingling between perception and reasoning's structures however poses the question of whether logic is independent from psychology (psychologism). In Chapter 2, I challenge a psychologistic interpretation of Peirce's theory of perception by contextualising the very notion of psychologism to nineteenth-century debates. The core of the chapter is a systematic re-reading of Peirce's early "cognition" essays (1868) and

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<sup>5</sup> For a distinction between Peirce's notion of inferentialism from the inferentialism of the neo-pragmatist Robert Brandom, see Chapter 1, footnote 6.

of the first two papers in his *Illustrations of the Logic of Science* (1877-8) in light of his inferential theory of perception. According to my reconstruction, one of the most promising consequences of the inferential theory of perception is the notion of “self” as a reality always in the process of becoming, shaped by testimony (i.e., what others think I am) as well as by its interactions with the world. I bring perceptual inferences to bear also on the notion of belief and on Peirce and James’ early interactions: Peirce’s adoption of perceptual inferences effectively explains the divergences between Peirce and James from early on.

The third chapter explores Peirce’s inferential account of perception in light of the German debate around perception and the possibility of psychology as a science. In spite of Kant’s claim that psychology could never become a science “properly so called,” Germany became, in the nineteenth century, the leading country in experimental psychology. Experimental psychology was indeed considered a science, but not in Kant’s strict terms. By investigating the influence of Kant’s ideas (and in particular of its distortions) I open a new perspective on the ongoing debate on the relation between Kantian and pragmatist philosophy (Gava 2014; 2008; Maddalena 2019). In particular, I retrace some trends of Kantian and post-Kantian thought which are particularly significant for Peirce’s theory of perception, specifically those of Johann Friedrich Herbart (1776-1841), Gustav Theodor Fechner (1801-1887), and Hermann von Helmholtz (1821-1894).

Chapter 4 returns to Peirce and his engagement with experimental psychology, both in the context of his studies in astronomy and in the already mentioned experiment with Joseph Jastrow (1885). Peirce’s experimental practice taught him to utilize methods developed in a certain discipline (i.e., psychology) in different contexts (i.e., photometry); I claim that this practice also influenced his philosophical reflection on the logic of science in 1882. Conversely, Peirce’s rejection of the fundamental law of psychophysics (advanced by Fechner in 1860) in his 1885 experiment is also motivated by his thorough inferentialism, which is no longer only an epistemic interpretation of perception but comes closer to a metaphysical theory of reality.

Chapter 5 explores a less conventional aspect of Peirce’s interest in psychology: namely, psychical research. While Peirce found himself little inclined to believe in psychical phenomena, he fought a philosophical battle for the possibility of considering them as “facts” along with all other facts of ordinary experience. Here I contrast Peirce’s

attitude towards psychical research with James': both offer an interesting example of the use of values to navigate the uncertain epistemic terrain of a new science, however they differ substantially in what they allow to count as a "scientific fact." In connection with the hypothesis of a wider reach of psychical life, I introduce Peirce's evolutionary metaphysics and his almost vitalist position regarding protoplasm. The psychical life of protoplasm was the object of inquiry of "general psychology," and Peirce brought his inferentialism to bear also on this issue.

Lastly, in Chapter 6 I revisit the manuscript *Telepathy* (c.1903), which is a standard reference for Peirce's mature theory of perception. Starting from the title, I reconsider *Telepathy* within the context of psychical research – an aspect of the *Telepathy* manuscript which is often sidelined by Peirce scholars. I demonstrate that if we take the historical context seriously, an investigation of perception is for Peirce an essential step to render otherwise unexplainable phenomena amenable to scientific investigation. Moreover, as Girel (2003) demonstrates, the argument in *Telepathy* can be further expanded with reference to Peirce's long-term engagement with William James, particularly with James' notion of "stream of consciousness." In the final part of the chapter, I bring to light the deep connection between metaphysics and epistemology and illustrate the relation between Peirce's inferential account of perception and his metaphysics of continuity (which he labelled "synechism"). Eventually, I show that Peirce's "mature" account of perception is actually so because it reaps the efforts of years of serious engagement with the phenomenon of perception and of its experimental investigation.

# Chapter 1. An Inferential Structure of Perception. *Whewell, Wundt and Peirce's Early Epistemology*

Hence observation as distinct from mere gazing consists in perception in the light of a question. [Enlarge a little on this – Whewell has not remarked this. Why.]

(Peirce 1869, *Harvard Lectures on British Logicians*, W2: 345).

## Introduction

While defining a unified theory of perception in Peirce's philosophy is problematic, there is a certain consensus among scholars which interprets his early theory of perception as inferential. Disagreement usually concerns its development, i.e. whether Peirce was an inferentialist all the way through, or whether he moved instead to a representational account of knowledge in his mature years.<sup>6</sup> For example, Richard Atkins maintains that Peirce “eventually abandons” the view that perception and cognition *are* inferences, although Peirce would have retained the notion of inference “to *model* mental processes” (Atkins 2018: 80; emphasis added).

Indeed, while Peirce claimed, in MS 798 (undated), that the process of perception and cognition *may* not be an inference from the point of view of psychology, he still believed that an inferential theory of cognition was the right interpretation at a logical and

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<sup>6</sup> My reconstruction of Peirce's inferentialism is independent from the inferentialism of the neo-pragmatist Robert Brandom (1994; 2000), although Brandom too recognises the distinction between inferentialism and representationalism as a fundamental one in philosophy: “Thus a big divide within Enlightenment epistemology concerns the relative explanatory priority accorded to the concepts of representation and of inference” (Brandom 2000: 46). This chapter and the next one, while not engaging with Brandom's views, provide an integrated historical and philosophical account of Peirce's early inferentialism.

at a philosophical level. I return to MS 798 later in this chapter (1.2), since it beautifully illustrates the intertwinement between cognition and perception, psychology and philosophy which constitutes the fascination and the challenge of Peirce's philosophy. Moreover, MS 798 contains Peirce's retrospective judgement on one of his early sources, namely Wundt. While this chapter focuses specifically on the early influence of Wundt, Peirce's retrospective remarks help address the broader question (which this work does not intend to solve)<sup>7</sup> of the overall coherence of Peirce's theory of perception over time.

Peirce's habit of returning to the same topics at the distance of some years as well as the unpublished status of most of his legacy mean that it is not uncommon to find contrasting or contradictory claims across Peirce's corpus. Mats Bergman (2007: 54) provides a useful overview of divergent interpretations on Peirce's theory of perception: from Richard Bernstein's (1964) metaphysic explanation, according to which Peirce's theory of perception reflects the "attempt to reconcile certain realist and idealist insights" (Bergman 2007: 54), to Sandra Rosenthal's (2004) and Thomas Short's (2000) more recent debates on the "foundationalism and anti-foundationalism" of Peirce's philosophy and its repercussions for his theory of perception. To these distinctions, Bergman adds the contrast between "representationalism" and "presentationalism" – i.e., mediation and immediacy – in Peirce's theory of perception.

Bergman's survey, aided by the systematic tracing of a fully Peircean distinction in his own theory of perception, shows that Peirce was indeed putting more emphasis on the immediate character of perception in the 1900s, or at least that at that time he was more ready to acknowledge the impression of immediacy that perception exerts on us.<sup>8</sup> However, his own semiotics – i.e., the doctrine according to which all knowledge is mediated by signs – prevented Peirce from entirely abandoning the inferentialist approach to knowledge (Bergman 2007: 54). The question is now whether such an approach could be justified also on the basis of Peirce's theory of perception alone.

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<sup>7</sup> In this thesis, I limit myself to highlighting elements of continuity between Peirce's early theory of perception and its later formulations. I see the inferential structure of perception as a clear sign of this continuity; however, I recognise that the notion of inference and its articulation is itself an object of study for Peirce and that different aspects of it may be relevant at different times.

<sup>8</sup> I will discuss Peirce's mature account of perception and his writings in the 1900s in detail in Chapter 6.



Taking a complementary approach to current scholarship, my aim here is to uncover the scientific and, in particular, the psychological roots of Peirce's early theory of perception. I argue that Peirce's acquaintance with Whewell and Wundt was early enough to be already present – officially or in correspondence, in a systematic or in a casual fashion – in the years 1865-1869. While there is no need to claim that those were *exclusive* sources, I maintain that William Whewell (1794-1866) and Wilhelm Wundt (1832-1920) contributed greatly to Peirce's epistemological and psychological background. Whewell and Wundt constitute, in a sense, the starting point of Peirce's successive articulations of his theory of perception and provide a historical justification for Peirce's belief that perception and cognition share the same underlying structure (see Ch.s 5 and 6): they are both the product of inferences.

Peirce engaged directly with Whewell in his Harvard lectures on the logic of science (1865) and it is possible to date the influence of Wundt on Peirce at least since 1869, since in that year Peirce obtained Wundt's permission to translate his *Vorlesungen über die Menschen- und Thierseele* [Lectures on Human and Animal Psychology] of 1863. Moreover, in retrospective accounts Peirce declared to have been studying Wundt's psychology since the year his *Beiträge zur Theorie der Sinneswahrnehmung* [Essays on the Theory of Sense Perception] came out (MS 326: "When, late in '62, I took up Wundt's *Beiträge*, I felt sure that a great scientific development was coming"). Wundt's theory of perceptual inferences is fully compatible with Peirce's 1865 lectures.

In 1.1, I introduce Whewell's account of scientific inference. Whewell's thesis was that induction – and not deduction – is the fundamental inference in science, since induction leads to discovery. Moreover, his remarks on the intertwinement of fact and theory show that he saw perception and reasoning as likewise inferential. This was also the thesis defended by the German psychologist Wilhelm Wundt in his early works (1862, 1863). In 1.2, I illustrate Wundt's early account of perception and its debts to Whewell's notions of inference. Wundt's most remarkable notion of "unconscious inference" turns out to incorporate crucial elements of Whewell's induction, particularly in the form called "colligation." In the 1870s, however, Wundt came to see his theory of unconscious inferences as too philosophical and distanced himself from it. Finally, in 1.3, I reconstruct Whewell and Wundt's joined influence on the early Peirce. In this, I follow Max Fisch, according to whom "Peirce's falling back on Whewell's philosophy of science (1869), and [...] the experimental psychology of Fechner, Helmholtz and Wundt (1862-1876) [...]"

have still to be broached” (Fisch [1965] 1986: 133). I address the influence of Hermann von Helmholtz and Gustav T. Fechner on Peirce’s theory of perception further in Ch. 3 and Ch. 4 respectively.

## 1.1 William Whewell and inferential knowledge

William Whewell (1794-1866), Master of Trinity College, Cambridge, was a British polymath and historian of science with a very ambitious project: to give science a new methodological foundation. Whewell’s project rested on a modernised interpretation of Bacon (Whewell 1858b: iii-iv; Snyder 2006; 2008) and on the rehabilitation of the role of hypothesis and “conjectures” in science (Laudan 1971; Lanaro 1987). Perhaps one of the clearest statements of his intentions is found in the Introduction to his 1858 *Novum Organon Renovatum*, which is a program of methodological reform from its very title onwards:

It may be a task, not hopeless, to extract from the past progress of science the elements of an effectual and substantial method of Scientific Discovery. The advances which have, during the last three centuries, been made in the physical sciences; [...] these are allowed by all to be real, to be great, to be striking; may it not be that the steps of progress in these different cases have in them something alike? [...] May it not be that discoveries are made by an *Organ* which has something uniform in its working? If we can shew that it is so, we shall have the *New Organ*, which Bacon aspired to construct, *renovated* according to our advanced intellectual position and office. (Whewell 1858a, iv).

The emphasis on discovery and the intertwining of history of science and logic of science are two elements that characterise Whewell’s approach to scientific method and which were eventually adopted also by Peirce. In famous passages of “The Fixation of Belief” (1877), the first of a series of epistemological essays that frame the results of Peirce’s early researches in philosophy, Peirce similarly claimed that “each chief step in science has been a lesson in logic” (Peirce 1877, W3: 233). Peirce was already a critical follower of Whewell in his 1865 *Harvard Lectures* (see sec. 1.3). In closing the section dedicated to Whewell’s contribution to the philosophy of science, Peirce stated:

I regret that we cannot consider any of the rest of the philosophy of this man of science [Whewell]; he is the most profound writer upon our subject and had he had the luck to be a German his fame would have been spread far and wide. (Peirce 1865, W1: 211).

Despite Peirce's regret for the lack of recognition that, as it seemed to him, surrounded Whewell's work, Whewell was an influential thinker in early Nineteenth-Century Britain and his influence was not limited to his own country. As Isaac Todhunter<sup>9</sup> (1820-1884) reports, there was a translation of his *History of the Inductive Sciences* in Germany and projects of translation in Italy and Russia.<sup>10</sup> Whewell's work was reprinted in New York and when Peirce delivered his 1865 *Harvard Lectures* he had a copy of Whewell's *Novum Organon Renovatum* to "pass round" (W1: 209).

In emphasising conjectural inferences in the logic of science, Whewell was consciously following the trend of Scottish common-sensism, which with Dugald Stewart (1753-1828) and Thomas Brown (1778-1822) moved away from the initial dismissal of hypothetical thinking by Thomas Reid (1710-1796) (Lanaro 1987: 20-23; Laudan 1971: 370; Brown 1820: 120; Stewart 1814, v.2: 424).<sup>11</sup> Whewell did not just believe that

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<sup>9</sup> Isaac Todhunter (1820-1884), Cambridge mathematician best known for his many textbooks on mathematics and geometry, also edited a biography and a "scientific correspondence" of William Whewell (Todhunter 1876).

<sup>10</sup> Todhunter (1876), v.1, p. 102: 'The *History* was reprinted at New York. It was translated into German by the eminent astronomer Littrow; and to this circumstance Mr. Whewell refers with proper satisfaction in the first edition of the *Philosophy*. An Italian translation was projected by Bishop de Luca, now a Cardinal, who had given an analysis of some of the Bridgewater Treatises in an Italian journal; but it does not seem to have been published. Some intention was formed at one time of executing a Russian translation, by Professor Braschman, of Moscow.' Todhunter (id., *ibid.*) also qualifies b. xviii of the *History of the Inductive Sciences* 'principally theory and speculation'.

<sup>11</sup> Christopher Hookway (2002; 1990) connected important aspects of Peirce's pragmatism with the common-sensism of Thomas Reid (1710-1796), the first and most famous exponent of the Scottish school of common-sensism. While I agree that common-sensism is an important influence in Peirce's philosophy, this section suggests that Dugald Stewart and Thomas Brown were, through Whewell and thanks to their more open attitude on hypotheses in science, closer sources for Peirce's pragmatism than Reid.

induction had a place in scientific methodology – he understood it to be a crucial element of scientific knowledge.

Throughout his life, Peirce associated the name of Whewell mostly with the notion of “colligation,” i.e. the very first step of induction, consisting of bringing unrelated facts under an overarching conception. However, Whewell’s influence on Peirce ran deeper than the adoption of a new name to distinguish a moment of induction and informed the way in which Peirce would start looking at the role of inferences in science: as oriented towards discovery and as *both* experimental and historical. In the following section, I give a brief account of those points in Whewell’s notion of inference to which Peirce will return in his *Harvard Lectures*: the notion of colligation, the fact-theory distinction and its relation to sensations and ideas.

“Colligation” was, for Whewell, the process of representing facts joined together under a law: “[colligation is] every case in which, by an act of the intellect, we establish a precise connexion among the phenomena which are presented to our senses” (Whewell 1847, v.2: 36). While the term “colligation” does not appear before the *Philosophy of the Inductive Sciences* ([1840] 1847), its definition remains remarkably similar to what was Whewell’s original concept of induction. Whewell’s first public statement on induction appeared in his 1831 *Review* of John Herschel’s *A Preliminary Discourse on the Study of Natural Philosophy* (1831), a “popular science” best-seller of its time (Lanaro 1987: 24; Cannon 1961, 1978). Whewell’s admiration and friendship for Herschel did not prevent him from noting that Herschel’s account of induction was somehow too empirical. Whewell’s own articulation of induction explains why all his successive books on history and philosophy of science will add the attribute “inductive” to “science” – as in *History of the Inductive Sciences*, 1836; *Philosophy of the Inductive Sciences*, 1840. Further, it exhibits how, the mental aspect of induction notwithstanding, Whewell strived to give a realist account of the results of those sciences:

If we are to judge from the various explanations given of the term induction, whenever it is attempted to be defined, the prevalent conceptions of its signification are sufficiently vague and inconsistent. We by no means pretend to object to any one’s using the term in a sense different from ourselves, and least of all if he can so express any valuable truth. But *we are here to employ it to designate that process which is the essential element of the physical sciences as they now exist, and in virtue of which they are called inductive*

sciences. For such a purpose, induction must be described to be *'the process of considering a class of phenomena, or two associated classes of phenomena, as represented by a general law, or single conception of the mind;*' such a single law, or representation, is capable of including so many phenomena, in virtue of the natural connexions of our thoughts [...] [*such a law*] will derive its validity from its being a connected representation of the phenomena, and nothing more. (Whewell 1831: 378-379; emphasis added).

A first element to remark from this quote is the *historicism* of Whewell's notion of reasoning in science. Induction is "the essential element of the physical sciences *as they now exist*"; Whewell presented himself as aware that induction was not always considered the essential character of human reasoning, that the very notion of reasoning introduced with modern science is a recent one, and that the role of induction in it may change. Conversely, scientific representations are also products of human ingenuity, and there is a fine line between the work of association performed by the "natural connexion of our thoughts" and the purposeful ordering of phenomena into a meaningful representation.

With colligation, Whewell dwells deeper on the relation between the introduction of a new conception and the relations instantiated by it. Indeed, once new relations are in place between sense data or data from any kind of scientific observation, they appear as something new; the organising principle could not have been found among the data themselves but was added to them by an operation of the mind. The organizing principle however does not remain separate from the data: in fact it is only through its complete merging in the data that the data appear to us as a phenomenon. In the *Philosophy of the Inductive Sciences*, Whewell illustrated this process with the metaphors of an organizing principle which lets a statue emerge from its block of marble, or an edifice from a pile of stones (Whewell 1847, v.1: 39). While the idea or theory that guides the colligation of facts is something which could not be found in the facts themselves, its outcome – if successful – will appear as a new "fact": the statue or the house do not convey their rules of composition but to the trained eye of the sculptor or of the architect. The "connexion" that colligation (and therefore induction) instantiates "among phenomena" is thus deeply connected to Whewell's framing of the relationship between "facts" and "ideas."

Such relationship is an open question in Whewell's scholarship, in that emphasising the "factual" or the "ideal" aspect contributes to different interpretations of Whewell. The debate swings towards Kant's transcendentalism if the ideal element prevails (Ducheyne

2011) or towards Bacon's empiricism in the other case (Snyder 2006; 2019). Whewell believed that perception and cognition did not happen at either end of the "facts" or "ideas" dichotomy but rather in their encounter, as "perceived" and "perceiving" respectively. Colligation reflects this attitude with its emphasis on relations, i.e. on the "connexion" established between the phenomena and the ideas. Most importantly for what I am going to discuss in this chapter, Whewell applied his theory of inquiry directly to his theory of perception – or rather, did not see a division between these two domains, and often used examples from "common-sense" to illustrate his more philosophical claims. Thus, for Whewell the transformation of sensations into concepts happens by means of an inference guided by a general idea:

We see objects, of various solid forms, and at various distances from us. But we do not thus perceive them by sensation alone. Our visual impressions cannot, of themselves, convey to us a knowledge of solid form, or of distance from us. Such knowledge is *inferred* from what we see: – inferred by conceiving the objects as existing in space, and by applying to them the Idea of Space. (Whewell 1847, I: 32. Emphasis added).

Whewell describes the process of forming "knowledge of solid form" (e.g., a table) or of "distance" as an inference in which the impressions coming from the senses are organised around an idea not conveyed by the impressions themselves: Space. Whewell often refers to vision as an example of this intermingling of sensory data and ideas in perception. Besides this aspect, the inferential interpretation of perception given by Whewell in this passage would probably facilitate its adaptation by Wundt in psychology (see sec. 1.2). However, if sensations and ideas are continuously intertwined, the question of what may count as "sensation" and what may count as "idea" (or "fact" and "theory") naturally comes up.

In Whewell's philosophy of science, what counts as "facts" is not just "perceptual data" but rather the taken-for-granted knowledge which grounds the next inferential steps. Ideas and laws also count as 'facts' at certain stages of inquiry. In the *Philosophy of the Inductive Sciences*, thoughts and things, theories and facts, ideas and sensations are only three couples of a longer list – which includes induction and deduction – of "Fundamental Antitheses in Philosophy." These are all for Whewell *apparent* antitheses: a closer look shows that, for each case, the two terms need each other to produce scientific knowledge.

Whewell spelled out this point most clearly in his 1858 re-elaboration of his *Philosophy of the Inductive Sciences*, appeared as *The History of Scientific Ideas*. In the final section of the “Fundamental Antitheses” chapter, significantly titled “The Fundamental Antitheses Inseparable,” Whewell confronted possible objections to the utility of a distinction between categories of interpretation deemed inseparable. Each proposition, it turns out, no matter how lofty, could be considered a *fact*, if it was true; and each fact, no matter how trivial, can be shown to contain some degree of interpretation, which indeed is only covered by habit. I will quote Whewell at length, since this section manages to connect all the epistemological and perceptual concerns seen above and to introduce a new notion which will be particularly important both for Wundt and for Peirce: the notion of unconscious inference. Whewell wrote:

...the distinction between Theory (that is, true Theory) and Fact is this: that in Theory the Ideas are considered as distinct from the Facts: in Facts, though Ideas may be involved, they are not, in our apprehension, separated from the sensations. [...] That which is a fact under one aspect, is a theory under another. The most recondite Theories when firmly established are Facts: the simplest Facts involve something of the nature of Theory. Theories and Facts correspond, in some measure, to Ideas and Sensations, as to the nature of their oppositions. [...] Even in the case in which our perceptions appear to be most direct, and least to involve any interpretations of our own, – in the simple process of seeing, – who does not know how much we, by an act of the mind, add to that which our senses receive? Does any one fancy that he sees a solid cube? [...] And thus, *we still have an intelligible distinction of Fact and Theory, if we consider Theory as a conscious, and Fact as an unconscious inference, from the phenomena which are presented to our senses.* (Whewell 1858b: 44-46. Emphasis added).

The idea of visual perception as a kind of inference was not new: George Berkeley (1685-1753) discussed it at length in his *Essay Towards a New Theory of Vision* (1709), although from a very different perspective than Whewell’s. I will return to Berkeley’s theory of vision in relation to Peirce’s theory of perception in Ch. 3, and to Peirce’s take on the interdependence of vision and touch in sec. 1.3. For now, what matters is to note, firstly, that for Whewell inferences were the underlying structure of all cognition, from

perception to scientific observation; and secondly, that *consciousness* became the ultimate ground to differentiate between perception and scientific observation, “Fact” and “Theory.”

In the *Philosophy of the Inductive Sciences* of 1847, Whewell illustrated the unconscious aspect of perception and its inferential structure with the example of a damaged or foreign inscription. In a context in which the information coming from the senses could not fit the existing structures of interpretation, the inferential structure of perception and its effort to construct a meaningful object for our consciousness would come to light:

If the inscription were entire and plain, in a language with which we were familiar, we should be unconscious of any mental act in reading it. We should seem to collect its meaning by the sight alone. But if we had to decipher an ancient inscription, of which only imperfect marks remained, with a few entire letters among them, we should probably make several suppositions as to the mode of reading it, before we found any mode which was quite successful; and thus, our guesses, being separate from the observed facts, and at first not fully in agreement with them, we should be clearly aware that the conjectured meaning, on the one hand, and the observed marks on the other, were distinct things, though these two things would become united as elements of one act of knowledge when we had hit upon the right conjecture. (Whewell 1847, I: 42-3).

The contrast between the speedy reading of a familiar sign and the stumbling process of reading an old inscription is instrumental in making us aware of those interpretative and *inferential* steps that are the backbone of our mental activity, but of which we are largely unconscious. Only when some extra effort is needed to complete the task at hand do we become conscious of the inferences involved. An important consequence of this line of reasoning is that perception is not fundamentally distinct from inductive inference: both involve the unification of a number of ‘stimuli’ or facts under an overarching conception. Moreover, the conception, when found, transforms our *perception* of the object: in the case of the inscription, the meaning and the reading become one and the same thing. The process disappears from our consciousness, leaving only the result.



Whewell's notion of inference, developed to give science a new methodological foundation, was thus supported by common-sense observations of perception and would support an inferential model of perception. In his 1865 Harvard lectures on the logic of science, Peirce first and foremost engaged with Whewell as a philosopher and writer on scientific method (see sec. 1.3). However, a particular element of Whewell's theory of induction – namely, colligation – lent itself to a wider cognitive domain beyond scientific knowledge alone. In the next section, after briefly mentioning Peirce's reasons for cherishing Wundt's early theory of perception, I examine this theory and its connections with relevant features of Whewell's theory of induction.

## 1.2 Wilhelm Wundt and inferential perception

...the production of propositions is of the general nature of inference; so that *inference is the essential function of the cognitive mind*. I know that psychologists will protest against this, and that even Wundt, who in the first edition of his lectures in the *Menschen und Thierseele*<sup>12</sup> [Lectures on Human and Animal Psychology] made the process of formation of a percept to be of the general nature of inference, has since retracted from that position. [...] *Wundt, in denying, as he now does, that there is any real affinity between perception and inference may be physiologically right but logically and philosophically he is wrong*. (Peirce, MS. 798, n.d., pp. 4-5. Emphasis added).

MS 798 is undated; however, some hints suggest that it belongs to a later period of Peirce's life. Indeed, Peirce couldn't have written it before Wundt dismissed his early inferential account of perception. Such dismissal occurred gradually: Araujo (2016: 84) traces the first glimmerings of Wundt's change of perspective as far back as his 1865 *Lehrbuch der Physiologie des Menschen* [Textbook of human physiology], but it is a shift that, if present at all, is too dim to be noticed by readers without the benefit of hindsight. In fact, as Araujo reports, Wundt was still embracing an inferential theory of perception in his 1867 review of Helmholtz's *Handbuch der physiologischen Optik* [Handbook of physiological optics], where Helmholtz articulated perception in analogy to conscious

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<sup>12</sup> The original title is *Vorlesungen Über die Menschen-und Tierseele* (1863).

inferences (see Ch. 3). Finally, in 1869, Wundt took a decisive step away from the inferential theory of perception in his article “Über die Entstehung räumlicher Gesichtswahrnehmungen” [On the formation of the visual perception of space]: from a theory of how perception actually happens, inferential perception becomes a “useful hypothesis” (Wundt 1869: 232; Araujo 2016: 86). However, this change in the ontological status of perceptual inferences is still not a methodological change; one has to wait for the second edition (1880) of Wundt’s 1874 *Grundzüge der Physiologischen Psychologie* [Principles of physiological psychology] for a fully-fledged “retraction” of the role of inferences and unconscious in psychology (Araujo 2016: 91). Thus, MS 798 was written *after* 1880.<sup>13</sup>

Peirce, while commenting on Wundt’s change of opinion on the inferential structure of perception, is referring to a central issue accompanying the definition of psychology as an autonomous discipline: the need to explain mental and perceptual processes in their own terms. Logical or philosophical explanations, like the inferential theory of perception, run the risk of taking our way of thinking about cognition for its real structure. In this quote, Peirce conceded that Wundt “may be physiologically right” in denying an inferential structure to perception; however, Peirce saw the inferential structure of perception as something deeper than a useful fiction, as his own mature analysis of perception shows (see Ch. 5 and 6).

The roots of this deeper commitment to the inferential structure of perception date back, I maintain, to Peirce’s early engagement with the first works of Wundt: his 1862 *Beiträge zur Theorie der Sinneswahrnehmung* [Essays on the theory of perception] and

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<sup>13</sup> Besides the shifts in Wundt’s theory of perception, another useful source for understanding the timeframe of MS 798 is its variant MS 1009 (p. 16): “For, as I have remarked in an early paper, it is conceivable that the consciousness of a cognition should increase continuously, and that at the limit where the cognition enters the mind the consciousness should be zero.” This paper could have been the 1885 paper with Joseph Jastrow “On Small Differences of Sensation” (see Ch. 4). In the next page, Peirce’s reference to his mature theory of graphs further postpones the likely date of composition of the note: “An inference is an observation. The state of things represented in the premise, or colligate of premises, or colligate of premises, is diagrammatically, or as I say, *iconically*, represented to the mind; and that diagram, or icon, being contemplated, the reasoning remarks or observes that some thing is true of it not explicitly asserted” (p. 17; emphasis of the text).

his 1863 *Vorlesungen Über die Menschen-und Tierseele* [Lectures on human and animal psychology], quoted above. As Peirce stated in the opening paragraph of his 1903 MS *Telepathy*,<sup>14</sup> which contains his mature theory of perception: "...ever since Wundt inaugurated the modern science of psychology about 1862 (the date of the collected publication of his *Beiträge zur Theorie der Sinneswahrnehmung*.) I have pursued that study both experimentally and speculatively..." (CP 7.597). The results of these studies, if often downplayed by Peirce in his effort to present himself as a pure logician, would influence his scientific practice deeply (see Ch. 4). In MS 606, written probably after 1903, Peirce stated:

It was more than forty years ago than the writer [i.e., C. S. Peirce] was among the first to be impressed by the awakening psychological and directly experimental psychology; and nobody could have been more deeply or intensely enthusiastic about this new movement in science than he, to whom all the great steps that had been taken before his eyes, the mechanical theory of heat, the conservation of force, the spectrum analysis, anesthetics, seemed to be quite outdone and faded by this new method. (Peirce, MS 606, 1903 p.q., 22-3).

In a footnote, Peirce added that, although "[t]he writer's own acquaintance with modern psychology began with the two important German works ["the Psychophysik of Fechner [and] Wundt's *Vorlesungen über die Menschen und Thierseele*, 1863], ...the science itself took its rise in England" (MS 606: 26). While Peirce passed a severe judgement on the "English school" in 1869 (see 1.3 below), in MS 606 he acknowledged the rich contributions of the English school. The aim of this section is to provide a point of access to Wundt's early philosophical psychology and of its early influence on Peirce. Peirce himself acknowledged its importance in a number of places: besides the manuscripts quoted, MS 326, n.d., reiterates the relevance of the profession of psychologists imagined by Peirce for the future, and MS 692, 1901, insists in the continuity of instinct and reason that an inferential account of perception makes

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<sup>14</sup> I discuss this manuscript in detail in Ch. 6.

possible.<sup>15</sup> I now turn to Wundt's inferential theory of perception, particularly in so far as it integrates Whewell's epistemology into psychology.

I do not claim to provide a novel interpretation of Wundt; rather, as in the case of Whewell, I am interested his theory of cognition in so far as it contributes to laying down the inferential structure of Peirce's early epistemology. Nonetheless, there is an element of originality in the following analysis. To the best of my knowledge, a systematic analysis of Wundt's thought in light of Whewell's epistemology has yet to be carried out. Richards (1980: 51) recognised the connection and blended Whewell's influence on Wundt together with other German influences, most notably that of Hermann Lotze (1817–1881). Araujo (2016) also mentions Whewell in relation to Wundt but without drawing any further implication from that. This section only highlights some meaningful correspondences and could be considered a first step in the direction of a more systematic study.

Wundt started his scientific career as a physiologist, working as an assistant of Hermann von Helmholtz (1858-1865) at the Physiological Institute of Heidelberg University (Araujo 2014). This may explain also the striking similarity between their theories of perception, especially in Wundt's early years. According to Araujo (2016: 69), it is Wundt and not Helmholtz who first introduced *in psychology* the idea of perception happening inferentially and of its inference being unconscious, although this idea had been present *in philosophy* for much longer: Arthur Schopenhauer (1788-1860) and Gottfried Wilhelm Leibniz (1646-1716) both endorsed forms of it (Araujo 2016: 70-71).<sup>16</sup> Just before Wundt and Helmholtz, inferential perception had been introduced *in physiology* by Johannes Müller (Müller 1826: 41-44; Araujo 2016: 71), although Müller's

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<sup>15</sup> “The Vorlesungen über die Menschen und Thierseele caused me to fully expect that the opening of the twentieth century would already find the profession of the psychologist recognized as quite as useful as that of civil engineer” (Peirce, MS 326); ““The psychological instructors of my college days used to tell me that when a dog is observed to act as if he had reasoned, he was really acting, not from reason, but from the “association of ideas.” But more advanced study taught me that that was a shocking abuse of a phrase which was invented to mark the greatest discovery ever made in the science of mind, namely, that all the operations of the soul take place according to one general formula which applies to reasoning and instinctive action alike” (Peirce, MS 692).

<sup>16</sup> According to Gary Hatfield (2002), the notion of perception as an inference dates as far back as the middle ages, to the work of the Arab mathematician Alhazen (965-1040).

inferentialism was based on a “naturalism” about the forms of experience that Helmholtz contested (Lenoir 1993: 112-ff.). Finally, the astronomer Johann Karl Friedrich Zöllner (1834-1882) applied the notion of unconscious inferential perception to explain a particular kind of visual illusion, toady called “Zöllner illusion” (Zöllner 1860; Araujo 2016: 71, n. 115). Helmholtz, who would have developed an inferential account of perception in the same years than Wundt, admitted “psychical acts” as unconscious inferences (Helmholtz 1867: 430; see Ch. 3, sec. 3.2.1). However, Helmholtz understanding of perception as inherently mediated and *symbolic* framed it in an epistemological, rather than psychological, context.<sup>17</sup>

As mentioned, using the concept of unconscious inferences to explain how sensations are produced was not a new move. However, a first significant difference between all these accounts and Wundt’s – according to Araujo – is that Wundt set off to investigate the phenomenon of perception from a declared *psychological* standpoint. A second interesting peculiarity of Wundt’s psychological account of perceptual inferences lies in its proximity to the epistemic program of Wilhelm Whewell. Whewell’s influence on Wundt goes beyond the occasional adoption of a specific terminology (although a crucial term, “colligation,” does pass on and becomes *Kolligation*) and pervades Wundt’s general view of perception. I articulate those general affinities first, before turning to a more detailed analysis of the structure of inference in Wundt and Whewell.

In the first chapter of the *Vorlesungen*, Wundt introduced his readers to the value of everyday experience, which partakes of both “material” and “ideal” elements, but which cannot be identified with either the materialist or the idealist accounts. Wundt underscored that the concepts that we use in our everyday experience are in fact developed through that very experience:

When we do not ask how concepts are used logically, but rather research how they build themselves empirically [erfahrungsgemäß], we find that they grow only through experience. Such is the teaching of everyday observation as well as of the history of science’s development. (Wundt 1863: 10).<sup>18</sup>

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<sup>17</sup> I discuss this aspect of Helmholtz’s account of perception, and its reception by Peirce, in greater detail in chapter 3.

<sup>18</sup> „Wenn wir nicht darnach fragen, wie die Begriffe logisch verwandt sind, sondern untersuchen, wie sie sich erfahrungsgemäß bilden, so ergibt es sich, daß sie selber sich nur auf dem Weg der

Here, Wundt is close to Whewell's epistemological stance in that he wants to go beyond the one-sidedness of a purely materialist or idealist account of perception and at the same time he recognises the developmental and historical character of the concepts that inform our experience.

Experience however to be significant cannot be simple observation: it needs to be *experiment*. In the second chapter, Wundt illustrated this with examples of scientific discovery coming from the history of science. Experiment is crucial because it allows us to discover the causal relations between appearances, while observation alone, no matter how long repeated, does not add any hindsight to the phenomena (Wundt 1863: 22). "Experiment" for Wundt does not refer to physical experiments exclusively: together with the example of a machine to produce small lightnings and sparks [Elektrisirmaschinen] to understand the working of lightening in a tempest, Wundt also refers to Copernicus' heliocentric theory as the result of an experiment:

As long as one merely observed, the general opinion was that the Earth stood still and the sun and stars moved. Indeed, many appearances could not be brought in accordance with it, but observation furnished no means to reach a better explanation. Then Copernicus appeared and he said: now then, I want to put myself on the sun for once! And behold, instead of the sun the Earth started to rotate; the observations which could not be accommodated before finally fit in; and the new system of the world was ready. *But it was an experiment that realised it: observation still tells us today, that the Earth stands still and the sun rotates...* (Wundt 1863: 22; emphasis added).<sup>19</sup>

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Erfahrung entwickeln. Dies lehrt uns ebensowohl die alltägliche Beobachtung wie die Entwicklungsgeschichte der Wissenschaft.“

<sup>19</sup> „So lange man bloß beobachtete, war die allgemeine Meinung, die Erde stehe fest und Sonne und Sterne bewegten sich. Freilich waren manche Erscheinungen damit nicht in Einklang zu bringen, aber die Beobachtung gab kein Mittel an die Hand zu einer besseren Erklärung zu kommen. Da trat Kopernikus auf und sagte: wohlan, ich will mich einmal auf die Sonne stellen! Und siehe, nun began sich statt der Sonne die Erde zu drehen, die Erscheinungen, die früher nicht in Einklang zu bringen waren, paßten, und das neue Weltsystem war fertig. Aber es war ein Experiment, das es fertig gebracht hatte, wenn auch nur ein Experiment des Gendakens: die Beobachtung sagt uns noch heute, daß die Erde steht und die Sonne geht...“

Astronomy, Wundt explained, could be seen as the observational science *par excellence*; however, something needs to be added to the observation in order for connections to emerge and what is added is an *action*, either performed on the experimenter's bench or in the imagination. Putting oneself at the place of the sun is an imaginative step which results in the possibility of giving the available data a different, counter-intuitive configuration: as Wundt stated, simple observation (as well as everyday experience) would suggest that the sun moves around the Earth rather than the other way around. By using these examples, Wundt reinforced the connection between experimental thinking and scientific method, a connection which became popular in Germany between 1750 and 1830 (Daiber 2001: 294–295).<sup>20</sup> However, Wundt's main aim was to convince his readers that psychology needed to become experimental in order to become a science. This would involve both the use of measuring devices and laboratories and the ability to think experimentally about psychical phenomena. Indeed, the use of Copernicus' metaphor in Wundt's example suggest that, according to Wundt, the experimental attitude is the “game-changer” that would make of psychology a proper science.<sup>21</sup>

The prominence of experiment in the definition of scientific method was common to Whewell too and would be a cornerstone of Peirce's methodology. Whewell's term “colligation” [*Kolligation*] was also used by Wundt to describe a part of the inferential

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<sup>20</sup> Fehige and Stuart (2014) see this close connection between experimental thinking and science, regardless of whether the experiments were actually performed, as a “forerun” of thought experiments. As they explain, “between 1750 and 1830, the use of experiments became (a) an essential part of university curriculum, (b) popularized in science books written for the laity, and (c) a primary source of evidence for or against scientific theories” (Fehige and Stuart (2014: 180).

<sup>21</sup> On the Copernican attitude as a change of perspective, Wundt would have the most famous antecedent in Kant, who, in the preface of the second edition of his *Critique of Pure Reason* (1787), applied Copernicus' move to the metaphysical question around external objects: “We should then be proceeding along the lines of Copernicus' primary hypothesis [mit den ersten Gedanken des Copernicus]. Failing of satisfactory progress in explaining the movements of the heavenly bodies on the supposition that they all revolved round the spectator, he tried [*versuchte*] whether he might not have better success if he made the spectator to revolve and the stars to remain at rest. A similar experiment can be tried in metaphysics, as regards the *intuition* of objects [In der Metaphysik kann man nun, was die Anschauung der Gegenstände betrifft, es auf ähnliche Weise *versuchen*]” (B xvi-vvii, translation by Norman Kemp Smith). Of note, the German term “Versuch” means both “attempt” and “experiment.”

processes characterising mental activity (on which more below), however colligation's fundamental step – namely, the introduction of a new conception – achieves the same result as Wundt's mental experiment: a change in perspective over the data under consideration. In a sense, which will be made clearer by Hermann von Helmholtz (as I illustrate in Ch. 3), the inferential structure of perception made perception itself an experiment, in which the data coming from the senses are hypothetically organised in conscious sensations which have to be “tested” for consistency and accuracy against the rest of experience.

The emphasis on experiment as the proper way of conducting observations also reflects another aspect of Wundt's epistemology which connects it to Whewell's, namely the focus on discovery. As much as Whewell in his philosophy of science wanted to understand how new scientific conceptions come about, in his *Vorlesungen* Wundt was very much interested in how sensation and ideas come about. The experimental investigation of the soul and the adoption of the experimental method are so closely intertwined that psychological processes are indeed understood as processes of inquiry, whose “essential components are concepts, judgements and inferences” (Wundt 1863: 42).<sup>22</sup>

If perception was analogous to inquiry, and in particular analogous to a process of discovery, still not every type of inference would play the same role in it. Following Whewell, Wundt in his 1863 *Vorlesungen* declared the “Rules” of the “old logic” – i.e., syllogistic logic – unhelpful when it came to introduce new concepts:

The old logic, taught at school, only treats of the Rules, according to which we apply general truths in experience. However, it does not concern itself with how we find truths. (Wundt 1863: 47).<sup>23</sup>

On the same line as Whewell, Wundt too paid homage to “Bacon, the founder of the philosophy of experience” (Wundt 1863: 47)<sup>24</sup> as well as to Kant, as he paraphrases

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<sup>22</sup> „Diese Bestandtheile sind die Begriffe, Urtheile und Schlüsse.“

<sup>23</sup> „Die althergebrachte Logik, die uns in den Schulen gelehrt wird, handelt nur von den Regeln, nach denen wir die allgemeinen Wahrheiten auf die Erfahrung anwenden, sie kümmert sich nicht darum, wie wir Wahrheiten auffinden.“

<sup>24</sup> „...Franz Baco, der Gründer der Erfahrungsphilosophie...“. “erfahrungsmäßig” (adj.), literally meaning “commensurable to experience,” also means “empirical.” “Erfahrungsphilosophie”



Kant's famous "thoughts without content are empty, intuitions without concepts are blind" (A51/B76) with "truths without application are sterile, applications without truths are nonsensical" (Wundt 1863: 47).<sup>25</sup> Wundt's empiricism however went as far as to claim that even the principles of mathematics are "facts of experience" [Thatsachen der Erfahrung] (Wundt 1863: 48) and that because of this all our inferences possess "an inherent insecurity, which is only contained by the limits of our experience. [...] Because of that [insecurity], every generalization is in principle a jump into uncertainty" (Wundt 1863: 50).<sup>26</sup> This aspect of insecurity and uncertainty that Wundt finds inherent to our inferential processes can be found again in Peirce's notion of "indefiniteness" or "vagueness," which, as Bergman (2009) shows, is crucial to understand Peirce's notion of experience (Bergman 2009: 268).

So far, I have highlighted those general features of Wundt's epistemology which are both close to Whewell's and to successive philosophical developments of Peirce's: the experiential and empirical basis of cognition, the crucial role of experiments and discovery, the preference for inductions, the intertwining of theory and practice (or concepts and applications), the idea that concepts are developed within and from experience even if they are not reducible to it, and the consequent vagueness inherent in every concept. Now, I turn to the most specific contribution of Wundt to psychology and to Peirce's understanding of perception, namely the idea that sensation is the result of an inferential process which happens unconsciously.

As mentioned above, according to Wundt the essential components of our psychical life (to which Wundt refers in general as "thought" [das Denken]) are concepts, judgements and inferences (Wundt 1863: 42). However, it is inference, as a process, that we rely on to pull together judgements and concepts:

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could therefore also be translated with "empirical philosophy." However, since Wundt's notion of empirical is really centred around experience and experiment, I maintained the more literal meaning in text.

<sup>25</sup> „Wahrheiten ohne Anwendung sind unfruchtbar, Anwendungen ohne Wahrheiten sind sinnlos.“

<sup>26</sup> „Alle unseren Schlüssen, welcher Art sie auch sein mögen, haftet daher eine Unsicherheit an, die bedingt ist durch die Grenzen unsere Erfahrung. ... Jede Verallgemeinerung ist darum streng genommen ein Sprung ins Ungewisse hinein.“

The only way known to us to tie together [Verknüpfungsweise] judgements consists in inference. Therefore, *if there is an activity of the mind* [Denkthätigkeit], which builds concepts out of signs [Merkmalen], *this activity cannot be anything but an inference.* (Wundt 1863: 55; emphasis added).<sup>27</sup>

This passage of Wundt reminds us closely of Peirce's MS. 798, quoted at the beginning of this section, where Peirce declares that "*inference is the essential function of the cognitive mind.*" This is a claim which became the backbone of Peirce's 1868 "cognition" essays, as Peirce declared in the essay "Some Consequences of Four Incapacities": "All valid reasoning, therefore, is of one general form; and in seeking to reduce all mental action to the formulae of valid inference, we seek to reduce it to one single type" (W2: 221); Or: "In every fallacy, therefore, possible to the mind of man, the procedure of the mind conforms to the formula of valid inference" (W2: 223). The "fallacies" in reasoning have, for Wundt as well as for Peirce, a correspondence in "illusions" in perception, an argument to which I return below. Firstly, however, it is important to underline the continuity that the inferential process establishes between cognitive and the perceptual processes.

This idea had already been present in Wundt's 1862 *Beiträge*. There, Wundt saw three main advantages to adopting inferences as the underlying logical structure of conscious and unconscious processes alike, namely: (1) *economy* – one hypothesis accommodates all kinds of perception, including perceptual illusions (Wundt 1862, 437-8), (2) (provisional) *generality* – because of the significant number of cases in which it is exemplified (Wundt 1862, 441), and, lastly, (3) *simplicity* – since it only requires one structure (i.e., the inferential structure) to explain both conscious and unconscious processes (Wundt 1862, 438). In Wundt's own words:

Thus, the presupposition that perceptual processes have a logical foundation is a hypothesis, entirely appropriate for each perception individually, at the same time suitable for all perceptual occurrences [...]. [This presupposition] meets the essential requirement of each well-grounded theory, namely that it

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<sup>27</sup> „Die einzige Verknüpfungsweise der Urtheile, die uns bekannt ist, besteht in dem Schluß. Wenn also eine Denkthätigkeit existiert, die aus den Merkmalen den Begriff bildet, so kann dies Thätigkeit nichts als ein Schluß sein.“

is the easiest possible and at the same time the most fitting description under which the facts of observation can be subsumed. (Wundt 1862, 437).<sup>28</sup>

Since we do not have the possibility to directly observe unconscious processes, the thesis that they develop following an inferential structure cannot but remain a hypothesis. However, it is a hypothesis that reaches the status of theory as it finds constant corroboration in explaining past psychological events and predicting future ones. Moreover, for the Wundt of 1862, this hypothesis is almost required by the absence of a fixed boundary between consciousness and unconscious, disclosed in ordinary experience. Wundt portrayed the relation between consciousness and unconscious as a fluid one, without fixed boundaries, in which the perspicuity of one of the terms (the conscious side) contrasts with the obscurity of the other (the unconscious). The experienced continuity between conscious and unconscious processes leads to suppose a similar structure underlying the two processes. This is reasoning by analogy from the known to the unknown, i.e. the attribution to the unconscious of a structure similar to the one that can be observed in the conscious domain. As a result, unconscious processes are modelled in analogy with conscious ones:

In the case of conscious thought, the logical form is not a hypothesis; it is rather, as noticed already, a fact of observation. But we see that it is never possible to establish a clear-cut boundary between consciousness and unconscious. Even if, from a scientific standpoint, consciousness can be clearly defined, still in reality both states [conscious and unconscious] overlap without boundary. Such a continuous passage is only thinkable when both states are essentially similar, when consciousness appears only as the further development of one and the same fundamental state. This perspective fits

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<sup>28</sup> “Es ist demnach die Voraussetzung der logischen Begründung der Wahrnehmungsvorgänge eine Hypothese, die für jede einzelne Wahrnehmung vollständig passend ist, und die zugleich auf alle Wahrnehmungsvorgänge passt, [...] sie hat das wesentliche Erforderniss jeder fest begründeten Theorie, dass sie der einfachste und zugleich passendste Ausdruck ist, unter welchen die Thatsachen der Beobachtung sich subsumieren lassen.”

perfectly with the assumption of a logical development of unconscious life.  
(Wundt 1862, 438).<sup>29</sup>

The “assumption of a logical development of unconscious life” is just another way to phrase the idea that unconscious processes are in fact inferences: inference, in this reading, is the logic of psychical phenomena, conscious or unconscious alike. Wundt further explained the unconscious activity of stimuli reception and their organisation into as a constructive process which, in its results, appears as the outcome of a series of inferences:

Through a more careful research on the outcomes of perceptual processes we notice, firstly, that these outcomes are very often mutually interconnected with each other, that particularly within the same sensory domain the realised perceptions [i.e., those perceptions which have become real for consciousness] build themselves up from easier perceptions. This building up activity, no matter how different it can be in the individual cases, still agrees in presenting itself as the outcome of a series of inferences, that is as a logical process. So far, no other hypothesis was found equally well placed to satisfy the appearances. (Wundt 1862, 437).<sup>30</sup>

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<sup>29</sup> “Für unser bewusstes Denken ist die logische Form nicht eine Hypothese, sondern, wie schon bemerkt, eine Thatsache der Beobachtung. Wir sehen aber, dass sich zwischen Bewusstsein und Unbewusstsein eine scharfe Grenze niemals ziehen lässt. Mag auch vom wissenschaftlichen Standpunkte das Bewusstsein scharf definierbar sein, in der Wirklichkeit gehen stets beide Zustände ohne Grenze in einander über. Ein solcher kontinuierlicher Übergang ist nur denkbar, wenn die beiden Zustände in ihrem Wesen mit einander übereinstimmen, wenn das Bewusstsein nur als die weiter Entwicklung eines und desselben Grundzustandes auftritt. Diese Betrachtungsweise passt nun vollständig zu der Annahme einer logischen Entwicklung des unbewussten Lebens. ”

<sup>30</sup> “Erstens bemerken wir bei genauer Untersuchung der Resultate der Wahrnehmungsvorgänge, dass dieselben sehr häufig in gegenseitiger Verbindung mit einander stehen, dass insbesondere innerhalb eines und desselben Sinnesgebietes die verwickeltern Wahrnehmungen aus einfacheren sich zusammensetzen. Diese Zusammensetzung, so verschieden sie in den einzelnen Fällen sein mag, hat doch immer das Übereinstimmende, dass sie als das Resultat einer Reihe von Schlüssen,

As I illustrate in the next chapter (Ch. 2), this idea is pervasive in Peirce's 1868 cognition papers and manuscripts of those years. Moreover, both Peirce and Wundt believed that, if sensations are the result of an inferential process, the process itself that brings sensations about remains unconscious. The unity of structure between conscious judgements and unconscious perception returns in Wundt's 1863 *Vorlesungen*, where Wundt states that "also sensory perception [sinnliche Anschauung] grounds itself on series of inferences. As we perceive colours or sounds, we are drawing inferences" (Wundt 1863: 57).<sup>31</sup> According to Wundt, unconscious inferences did not have a psychological content but rather a merely "material" one, which remained inaccessible to psychological investigation (Wundt 1863: 57-8). However, because of their supposed inferential structure, they could still be investigated logically.

Chapter 28 of the *Vorlesungen* is dedicated to the analysis of judgement from a logical standpoint; here, the term "Kolligation" finally emerges, together with "synthesis," a term that Wundt will retain even after his rejection of the inferential theory of perception. Here, I limit my account to how "Kolligation" – an explicit borrowing from Whewell's "colligation" – characterised the first step of induction:

Induction starts with the activity of tying together [verknüpfen] Facts, which are abundantly given in experience either at the same time or in regular succession. *Colligation* [die Kolligation], *the tying together of facts* [die Verknüpfung der Thatsachen], *is therefore the first step of induction*. (Wundt 1863: 434. Emphasis added).<sup>32</sup>

*Kolligation* was thus (1) "the activity of tying together facts" and (2) "the first step of induction." Although Wundt criticised Whewell's blanket use of colligation (Araujo 2016: 40, n.49) and preferred to restrict it to the initial moment of induction, he recognised

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also eines logischen Processes sich betrachten lässt, während bis jetzt keine andere Hypothese aufgefunden wurde, welche in ähnlicher Weise den Erscheinungen zu genügen im Stande ist."

<sup>31</sup> „Sogar die sinnliche Anschauung gründet sich schon auf Reihen von Schlüssen. Wenn wir Farben oder Töne wahrnehmen, so machen wir Schlüsse.“

<sup>32</sup> „Die Induktion beginnt damit, daß sie Thatsachen, welche ihr in der Erfahrung in einer großen Zahl von Fällen entweder gleichzeitig oder in regelmäßiger Folge gegeben werden, steht mit einander verknüpft. *Die Kolligation, die Verknüpfung der Thatsachen, ist daher die erste Stufe der Induktion.*“ Emphasis added.

the importance of this concept and made it part of his own account of inductive inferences. The “tying together” [verknüpfen] of facts or signs [Merkmale] characterised all inductive inferences in any psychological process, from sensation to reasoning.

As we have seen, according to Wundt unconscious processes were pervasive but hidden. Sometimes however it was possible to make these underlying processes come to light, as the case of sensory illusions. Because of the lack of consciousness in the processes that brought them about, Wundt maintained, sensory illusions cannot be dismissed at will, nor is the conscious awareness of their illusory character able to counter the impression of those perceptions. Wundt wrote:

...it is apparent that, from time to time, our feeling [Empfindung] reaches the wrong conclusion. Despite our best knowledge, such conclusion cannot be corrected, no matter the amount of commitment we put in it. This is because feeling's inferences [Empfindungsschlüsse] have nothing to do with consciousness or commitment. (Wundt 1863: 225-6).<sup>33</sup>

Peirce too would refer to examples from sensory illusions in support of the inferential analysis of perception in the *Telepathy* manuscript (1902), which I analyse in Ch. 6. The difficulty in getting rid of perceptual illusions in spite of our consciously knowing that they are just illusions suggested to both Peirce and Wundt that they were the result of unconscious inferences. However, neither Wundt nor Peirce wanted to support the thesis that perception is entirely free of conscious influences.

Between conscious and unconscious inference, they saw a bridge: habit. Wundt saw a connection between repeated unconscious induction and ‘reflexive’ response of our nervous system to stimuli and made the hypothesis of a change in the underlying physiology of the brain. Although the idea of a change in the physiology of the brain was articulated only metaphorically, Wundt talked of repeated actions as a process that would shape the nervous paths of our brain, similarly to how water, flowing constantly in the same direction, eventually cleaves a furrow (Wundt 1863: 233-4). The furrow is nothing but the habitual flow of water; however, it will compel future rain to collect and flow in

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<sup>33</sup> „...es hat sich ja gezeigt, daß wir in der Empfindung zuweilen Fehlschlüsse machen, die dann unser besseres Wissen mit aller Absicht nicht zu korrigieren im Stande ist, eben weil jene Empfindungsschlüsse mit Bewußtsein und Absicht gar nichts zu thun haben.“

the same direction. Habitual reactions are thus seen by Wundt as nothing but riverbeds in our nervous system, collecting stimuli and compelling appropriate reactions.

Peirce too gave a prominent role to physiology and habit in his 1877-8 *Illustrations of the Logic of Science* – a feature that long contributed to a “psychologistic” reading of those essays (see Ch. 2). As in the case of Wundt, however, Peirce’s physiology goes hand in hand with the logical (i.e. inferential) interpretation of the formation of concepts and sensations. In the next section, I turn to Peirce’s explicit reception of Wundt in his review of the second edition of James Mill’s *Analysis of the Phenomena of the Human Mind* ([1829] 1869). Within this review, Peirce took the opportunity to promote Wundt’s *Vorlesungen* and to defend Wundt’s method and results over those of the “English school.” Before that however, I illustrate Peirce’s reception of Whewell in Peirce’s first public lectures on philosophy – the Harvard Lectures of 1865 – and in his 1869 Harvard Lectures on British Logicians.

### 1.3 Peirce on Whewell and Wundt (1865-1869)

As I argued, Peirce’s inferential theory of perception and cognition was deeply influenced by the thought of Wundt and Whewell, respectively; moreover, Wundt was also influenced by Whewell’s epistemology in developing his early psychology (Wundt 1863). I warranted my claim with brief associations between Whewell or Wundt’s positions and Peirce’s, with little regard for the timeframe of Peirce’s remarks. In this section, however, I argue that Peirce’s acquaintance with Whewell and Wundt was early enough to be already present – officially or in correspondence, in a systematic or in a casual fashion – in the years 1865-1869. Peirce’s reception of Wundt’s philosophy rested on a familiarity with past debates concerning the nature of perception and its epistemological value. Such background can be seen at work already in Peirce’s 1865 Harvard lectures. In this section, I start with this lecture series to introduce Peirce’s appreciation of Whewell’s logic of science and the complex relation between Whewell and John Stuart Mill. I then move to a later lecture series, the 1869 lectures on British logicians, to expand on Peirce’s appreciation of Whewell’s philosophy of science. Lastly, I draw from Peirce’s review of Mill of the same year (1869) to illustrate the agreement between Peirce and Wundt on experimental psychology and its implications for epistemology.

In 1865, Peirce inaugurated his philosophical career with a series of lectures delivered at Harvard University “On the Logic of Science.” Volume 1 of the *Writings* contains “as near an approach to a complete letterpress edition [...] as the surviving manuscripts make possible” (Fisch 1982: xxx). The Lectures are a good document of Peirce’s range of interests, covering virtually all the most discussed topics in philosophy and logic of the time: the connection between logic and scientific inquiry, the difference between psychologic and un-psychologic logics, the nature of inference and of hypothesis. An entire lecture – not numbered – is dedicated to the “Theories of Whewell, Mill, and Comte [sic.]” (W1: 205-223). They are presented as the three major approaches to the logic of science: Mill is the champion of empiricism and nominalism, Comte of positivism, and Whewell of a transcendentalist, Kant-inspired understanding of science.<sup>34</sup> Peirce was aware of the controversy between Whewell and Mill on induction and criticised Mill’s objections to Whewell’s notion of colligation:

Mill objects altogether to this [i.e., Whewell’s] definition of induction on the ground that this colligation of facts is merely a new description of the phenomena. [...] Mr. Mill's objection [...] is an exceedingly awkward one; and Dr. Whewell's definition is perfectly consistent with his fundamental principles and applicable to all cases of induction which his opponent could adduce. (W1: 206).

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<sup>34</sup> Since 1849, the date of the publication of Whewell’s *Of Induction, with Especial Reference to Mr. Mill’s System of Logic*, a controversy on the role of induction in the logic of science divided Mill and Whewell. In his *Autobiography*, Mill acknowledged his debt to Whewell, who (unwittingly) provided him with a template for his own position and became a catalyst of attention to Mill’s work: “Happily for me, Dr. Whewell, early in this year [1837], published his *History of the Inductive Sciences*. I read it with eagerness, and found in it a considerable approximation to what I wanted. Much, if not most, of the philosophy of the work appeared open to objection; but the materials were there, for my own thoughts to work upon...” (CWJSM 1: 215). And also: “What hopes I had of exciting any immediate attention, were mainly grounded on the polemical propensities of Dr. Whewell; who, I thought, from observation of his conduct in other cases, would probably do something to bring the book into notice, by replying, and that promptly, to the attack on his opinions” (CWJSM 1: 231).



The awkwardness of Mill's criticism of Whewell came – in Peirce's perspective – from Mill's detachment from scientific practice. Mill cannot produce cases in which Whewell's definition of induction does not apply. In fact, Mill's *Logic* (1843) aimed to assess the validity of induction formally rather than historically, i.e. “to provide rules and models to which if inductive arguments conform, those arguments are conclusive, and not otherwise” (Mill 1843/1981, W7: 430). Peirce would appreciate Mill's formalizing intentions, and, while he acknowledged Whewell “the most profound writer upon our subject [i.e., the logic of science]” (W1: 211; see also sec. 2.1), he criticised Whewell's formal treatment of induction.<sup>35</sup> Whewell's theory of induction and especially his notion of colligation constituted for Peirce “the possible germ of a strictly logical theory of induction” (W1: 209) to be nourished and cultivated.

In his *Organon*, Whewell presented “inductive tables” which should exhibit “the relation of the successive Steps of Induction” in two sciences, optics and astronomy. The tables present the “first facts” of a given science on the top of the page. Curly brackets unify a number of them under one historic figure (e.g. Euclid, Ptolemy, Snell, Newton) and their theories; those theories are eventually unified again with other curled brackets. New facts are introduced when needed and separated with vertical lines. Those tables – Peirce observed – did not possess a formal structure from which one could assess the inferences' validity. Indeed, it was impossible to gauge from them whether the inductive processes that they represent are formally right or wrong. In Peirce's words: “Is there any

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<sup>35</sup> The influence of J. S. Mill's logic on Peirce's has been broached by Bellucci (2015) who argues for an influence on Peirce of Mill's theory of natural kinds. For what concerns psychology, in 1869 Peirce criticised the “English school” of associationists (see below), of which the Mills occupied a central position. However, J. S. Mill's account of association is more refined than Peirce admitted in 1869 and could have had a greater impact on Peirce's thought than he acknowledged. See for instance Mill's (1865) *An Examination of Sir William Hamilton's Philosophy*, where Mill wrote: “Besides present feelings, and possibilities of present feeling, there is another class of phaenomena to be included in an enumeration of the elements making up our conception of Mind. The thread of consciousness which composes the mind's phaenomenal life, consists not only of present sensations, but likewise, in part, of memories and expectations. [...] each of them involves a belief in more than its own present existence” (CWJSM 9: 193-4).

other conception besides that adopted which would have colligated those facts? How am I to know?" (W1: 210). Whewell's tables did not have a structure that would allow us to tell genuine and apparent inductions apart.

Peirce had more space to expand on Whewell and on his role for the philosophy of science in his 1869 Harvard Lectures "On the British Logicians (W2: 309-345; Fisch 1982: xxiv). There, Peirce again proclaimed his appreciation of the general outline of Whewell's philosophy of science: "There is probably no one maxim of logic the ignorance of which by ordinary people produces such deplorable results as this that all Facts involve ideas," wrote Peirce in 1869 (W2: 345). The "maxim" that "all facts involve ideas" was a core thesis of Whewell's epistemology, cast as one of the "Fundamental Antitheses" in his *Philosophy of the Inductive Sciences* ([1840] 1847) and in his *The History of Scientific Ideas* (1858) (see sec. 1.1).

Wundt's presence is more subtle, but no less influential, in Peirce's writings of the time. Max Fisch ([1965] 1986: 119-120) already noticed that in 1869 Peirce asked and obtained permission from Wundt to translate his 1863 *Vorlesungen* into English (letter of Wundt to Peirce, May 2, 1869). Later in the same year (July), Peirce wrote to his father Benjamin highlighting for him interesting points of another work in experimental psychology, namely Gustav Fechner's *Elemente der Psychophysik* [Elements of Psychophysics] of 1860: this is another clue of Peirce's continued interest in experimental psychology. Lastly, in November 1869 Peirce's review of the second edition of James Mill's *Analysis of the Phenomena of the Human Mind* was published in *The Nation*, and Peirce took the opportunity to reiterate his preference for the German school of psychology initiated by Wundt.

A hint of Peirce's acquaintance with the long tradition of debates on the inferential or immediate nature of perception appears with the example of the "hypothesising baby," which Peirce introduces twice: in the second lecture, as a tongue and cheek comment on Newton's dismissal of hypothesis in science; and in the tenth lecture, where the same comment on Newton is made in order to illustrate the respective roles of deduction, induction and hypothesis in science. The gist of the example is that hypotheses are an inevitable step of any kind of cognition, including the perceptual schemes that we elaborate unconsciously as little babies; therefore, it is untenable to imagine building scientific knowledge without hypotheses, as some interpreters (among which the Scottish

common-sensist Thomas Reid: see sec. 1.1) would maintain. In the second lecture, Peirce wrote:

*Hypotheses non fingo*, said Newton; striving to place his theory on a firm inductive basis. Yet provisionally we must make hypotheses; we start with them; *the baby when he lies turning his fingers before his eyes is testing a hypothesis he has already formed, as to the connection of touch and sight.* (W1: 186. Emphasis added).

Although the “hypothesis already formed” could be read as a reference to unconscious inference within a Wundtian framework, the connection of touch and sight immediately refers to one of the most debated epistemological problem of the Enlightenment: namely, that of how our sensory perception could be integrated into the unitary perception of a world, a problem that is still known today in neuroscience as the “binding problem.” In particular, in order to understand Peirce’s example and its import for both his theory of perception and his epistemology, it is therefore necessary to situate Peirce’s hypothesising baby in the broader context of seventeenth- and eighteen-century discussions on the relation between touch and sight.

Philosophically, the problem of the nature of the connection between touch and sight was considered relevant for assessing the presence (or absence) of innate ideas or structures of experience. If some ideas were innate, such as e.g. geometrical ideas, then the ability to recognise shapes should be transferrable across different senses, and a person born blind should be able to recognise objects that they had previously known just by looking at them. While each philosopher gave his own solution, the major divide was between a passive representation of the mind and an active one. For empiricists or sensationalists, like Locke or Étienne Bennot de Condillac (1714-1780), it was the simple repetition of different sensations that would eventually build for our consciousness the objects of the outer world; others, from the tradition initiated by Gottfried Wilhelm Leibniz (1646-1746), argued that the mind possesses innate ideas (Tonelli 1974) and that in any case it contributes to the organization of sensation, since that no meaningful order could arise from mere repetition of stimuli.

It was thanks to William Molyneux (1656-1698) that the binding problem started to be investigated also from an empirical perspective (mental experiments trying to settle the question abounded). Molyneux set the terms of the problem in 1688 as a problem for

Locke (Locke 1978, v.3, n. 1064): if a man born blind could receive his sight back all of a sudden, would he be able to recognise by sight alone the objects that he had been acquainted with by touch? This problem was firstly investigated experimentally by Doctor Cheselden, who in 1728 performed an operation of cataract couching on a 13 years old boy who allegedly had been blind since birth (Cheselden 1728). As Marjolein Degenaar (1996) shows, Molyneux's question was not easy to settle and kept fuelling debates in medicine and philosophy alike up to the present day.

The cradle carrying Peirce's baby may have been constructed out of very old epistemology debates; however, one thing is certain – the baby is perfectly alert and active. The fingers turning in front of his eyes are an experiment, about which he is *making an hypothesis*. The connection of sight and touch is established in the infant by trial and error; the process underscoring it – albeit unconsciously – appears to be that of an inference. The image of the hypothesising baby brings together different aspects of Peirce's early engagement with inquiry. On the one hand, we have the idea that some form of inference – in this case, hypothetical inference – is a necessary feature of any cognitive process; on the other hand, there is the idea that even when neither the cognitive content nor the cognitive process is explicitly recognised as such, still they are present and can be brought to the observer's attention. The hypothesising baby thus makes a case for a mediated and hypothetical structure of cognition which can happen unconsciously, so that their results may initially appear as a simple 'given'. With the baby example, Peirce argued that inference permeates every stage of cognition and presented hypothesis as a fundamental form of inference, not reducible to induction or deduction (W1: 283).

In a sense, the problem of the baby of finding the right hypothesis to establish a connection between touch and sight and the problem of the scientist of finding the right conception that would unify a series of observations are two sides of the same problem; an awareness of this parallelism can be read also in the opening paragraph of one of Peirce's most famous philosophical works, the 1868 "On a New List of Categories":

This paper is based upon the theory already established, that the *function* of conceptions is to reduce the manifold of a sensuous impressions to unity, and that the *validity* of a conception consists in the impossibility of reducing the content of consciousness to unity without the introduction of it. (W2: 49; emphasis added).

The “function” of a conception could be investigated historically and psychologically, its “validity” was instead where a logical evaluation came in. Nathan Houser and Christian Kloesel rightly point out the similarity of Kant’s epistemology with the idea that “the function of conceptions is to reduce the manifold of a sensuous impressions to unity” (Houser and Kloesel 1992: 373, n. 1), however Peirce could have appealed to a variety of sources in support of his thesis, something that probably contributed to the feeling of it being “established.” In particular, in his 1869 lectures series on British logicians, Peirce talked of the analogies of Whewell’s thought with Kant’s and of its meaning for the validity of those philosophical theories that they seemed to share: namely, that “a scientific conclusion is composed of facts and of ideas. To reach it, the facts must be brought together – *colligated* – and the conceptions must be rendered distinct – *explicated*.” (W2: 340; emphasis of the text). Peirce started by asking whether Whewell really derived his philosophy of science from his knowledge of the history of science, or whether history was just the dress of some purely philosophical theory:

...the question comes now to be asked did Dr. Whewell with all his knowledge of the history of science really derive his theory from that, or did he only use his knowledge to give a colour of verisimilitude to a theory which had come down to him as a metaphysical tradition of which he had drawn from Kant or some other metaphysical writer? (W2: 338-339).

Peirce’s answer was that Whewell’s philosophy of science really derives from the history of science as well as from his extended and first-hand experience as a scientist;<sup>36</sup> moreover, the overlapping of some aspects of his philosophy with Kant’s should not be taken as a flaw in Whewell’s thesis, rather as a “powerful support”:

If then it [Whewell’s theory] does happen to be in accord with the results of the profound analysis of cognition by Kant – a result which must be allowed

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<sup>36</sup> Peirce, W2: 337: “...Dr. Whewell's qualifications for treating of science could hardly have been better than they were, for he was not only a scientific specialist but an eminent scientific investigator, his works upon the tides containing a research of no ordinary importance. Indeed they will never be forgotten.” On Whewell’s work on tides and his importance for a better understanding of his philosophy of science see Cristalli and Dorado, *forthcoming*; Ducheyne 2010; Reidy 2008.

by all who would avoid the extremes of sensualism and absolute idealism – I say if Whewell's theory accords with this – as well as with the History of Science – that ought to be regarded rather as a powerful support of the theory rather than as a disproof of it. (W2: 341).

Indeed, perhaps the most striking difference between Kant's theory and Whewell's, at least from the perspective of philosophy of science, is Whewell's methodical effort to analyse the "results" of cognition, be they scientific theories or general ideas, in terms of a *history* and a *practice* of science, rather than on a priori grounds. Fisch (1982: xxiv) claimed that Peirce saw in these aspects of Whewell – his direct acquaintance with many different experimental sciences, his thorough examination of the history of science – also the basic requirements for engaging with the logic of science meaningfully. In the end, Peirce viewed Whewell's whole philosophy of science as the result of a "scientific induction" from the "facts" of history and attributed Whewell's ability in performing such inductions to his knowledge of the history of science as well as to his scientific practice:

Indeed I am so forcibly impressed with his [Whewell's] work's having all the characters of a Scientific Induction from the History of Science that superior as I think that he is to other English and French writers upon the philosophy of science in point of learning and specially in scientific training, I think that his preeminent superiority lies in the perfect singlemindedness with which he has derived his theories from his facts. (W2: 339).

The difference between Peirce's cautious judgement over Whewell's "derivations" in his 1865 lectures and the enthusiastic tone with which Whewell's philosophy of science is presented in the 1869 lectures can be explained by the different focus of the two lecture series – the first being on the logic of science generally considered, the second on the evaluation of "British logicians." In the latter context, Peirce would do nothing but praise Whewell's philosophy of science. Both the 1865 and the 1869 judgement remain compatible and help understand the further developments of Peirce's thought: Peirce maintained that a formal study of inferences was crucial to improve reasoning in science and chastised Whewell for not dwelling enough with the formal properties of inferences, although he recognised the value of his deep acquaintance

with the history of science and of his first-hand experience in experimental science in formulating a useful philosophy of science.

Peirce's requirements for philosophy of science – namely, to be grounded in a first-hand familiarity with the history and the practice of science – are also reflected in the way he evaluated the second edition of James Mill's *Analysis of the Phenomena of the Human Mind* ([1829] 1869). Peirce took the opportunity with this review to engage with the whole “English school” of psychology: John Stuart Mill and Alexander Bain's notes to the second edition enabled Peirce to pass a judgement not just on one book but on a whole school of thought. As Peirce declared, “These notes are chiefly of interest as forming the clearest exposition of the present state of opinion in that [the English] school, and of the changes which it has undergone since 1829 [year of the first edition of James Mill's *Analysis*]” (W2: 302). The 1869 review offered Peirce an invaluable opportunity to expound the reasons of his inferentialism in psychology and to proclaim his loyalty to Wundt.

As mentioned above, in 1869 Peirce was in correspondence with Wundt and obtained permission to translate his 1863 *Vorlesungen* into English (Fisch [1965] 1986: 119). In 1868 he had published, together with the quoted *New List*, two seminal papers on human cognition, “Questions Concerning Certain Faculties Claimed for Man” and “Some Consequences of Four Incapacities” (to which I return in Ch. 2). Richard Smyth (1985) claimed that the “Questions” paper constituted “a well-informed and effective demolition of the doctrine of intuition at the base of John Stuart Mill's empiricism” and that the positive elements of Peirce's criticism derived from “the neo-platonic heritage in American transcendentalism” (Smyth 1985, 157). My account adds another layer to Peirce's position, by qualifying the methodological reasons that made it impossible for Peirce to embrace Mill's empiricism in science.

My starting point is a passage on the methodology of the “English school,” which deserves to be quoted at length:

...in general their [the English philosophers'] method may be described as *simplifying existing hypotheses and then endeavouring [sic.] to show that known facts may be accounted for by these simplified hypotheses*. In this way, a highly elegant and instructive system has been created; but it is not pre-eminently scientific. It might be scientific if these philosophers occupied themselves with subjecting their modified theories to the test of exact

experience in every possible way, and spent their time in a systematic course of observations and measurements, as some German psychologists have done. But that is not their business; they are writers. Their energies are occupied in adjusting their theories to the facts, and not in ascertaining the certainty of their theories. This cannot be said to hold good fully of Mr. Bain; his books are largely occupied with correcting and limiting theories; but so far he appears quite different from the English school generally, to which, however, he certainly belongs. *Desultory experience is what they build on, and on that basis no true science can be reared.* (W2: 303-4; emphasis added).

Peirce's disappointment for the methods of the English schools of the Mills (since Bain was partially exempted from this criticism) could be bluntly put as "it is not science, but a pretty story of what we may wish our phenomena may be." On the one hand, the hypotheses used are "too simple;" on the other hand, experience itself is only analysed as fragmented. Of course, simplicity does not mean falsity, and the system of the Mills could very well be found to be true; however, – Peirce complained – the Mills did not dedicate themselves to "systematic [...] observations and measurement," so that the agreement of facts with theory is ultimately determined only by an agreeable prose.

According to Peirce, the "chief point of English psychology" (W2: 304) was the Lockean thesis that "every idea is a copy of a sensation." However, such opinion finds no warranty in experimental psychology, and its adoption by the English school is dogmatic and unwarranted: "The doctrine that an idea is the copy of a sensation has obviously not been derived from exact observation. It has been adopted because it has been thought that it *must be so...*" (W2: 306; emphasis of the text). Most importantly, the consequence of this thesis of Locke – that every idea is a copy of a sensation – is the establishment of a fundamentally *representationalist* account of perception and knowledge. As Brandom briefly states, "The British empiricists [...] were clear in seeking to derive inferential relations from the contents of representings [sic.] rather than the other way around. In this regard they belong to the still dominant tradition that reads inferential correctnesses [sic.] off from representational correctnesses, which are assumed to be antecedently intelligible" (Brandom 2000: 46-7). In sum, the chief difference between an inferential account of perception (such as the one that Peirce, following Wundt, advocated) and the representational account of perception is that the first maintains that inferences are the fundamental explanatory units of cognition, while the second takes as (unexplainable)



starting point the “fact” of representation, i.e. that we have ideas and that those ideas seem to “copy” (in some sense) the external objects.

The problem becomes more intricate however once one moves beyond the question of how the basic unit of cognition is structured, to consider the rich and varied cognitive processes that usually constitute our inner experience. Locke had introduced the doctrine of association of ideas as an empiricist explanation for the formation of conceptions. However, the association of ideas – according to Peirce – could not be explained from the perspective of a purely representational account of cognition. “Association” cannot add much by itself when the only function of the mind is to represent images of the objects outside. Peirce believed that Wundt – one of the “German psychologists” quoted above<sup>37</sup> – offered the possibility to explain association’s mechanism with his theory of perception as an unconscious inference:

At present, the doctrine [of the association of ideas] has received a transformation at the hands of Wundt of the most fundamental description. *He has solved the perplexing questions concerning the principles of association by showing that every train of thought is essentially inferential in its character* and is, therefore, regulated by the principles of inference. But this conception is also found in Aristotle. (W2: 307; emphasis added).

In a footnote, Peirce added: “This idea is fully explained in his very important and agreeably written *Vorlesungen ueber die Menschen- und Thierseele*” (W2: 307). Thus, by 1869 Peirce had absorbed Wundt’s inferentialism to the point of claiming that Wundt had “solved” the problem of association. Wundt’s solution was not just a recourse to logical formalism: his hypothesis of an inferential structure of cognition was legitimised by experimental research and by the scientific values it fostered (i.e., simplicity, generality) in being able to unify perception and reasoning alike. In contrast, the “literary” epistemology of the English school, which proposed a theory of perception as immediate representation of an object in the observer’s mind, remained a “simplified hypothesis” without value for furthering inquiry.

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<sup>37</sup> Other “German psychologists” are identified by the editors (Edward C. Moore, Max H. Fisch, Christian J. W. Kloesel, Don D. Roberts, Lynn Ziegler) of the *Writings*, v. 2, as Hermann von Helmholtz and Gustav Theodor Fechner (W2: 532).

## Conclusion

In this chapter, I broached Peirce's early inferentialism in light of the philosophy of science of William Whewell and of the philosophical psychology of Wilhelm Wundt. Whewell's philosophy of science would not only convey to Peirce the belief that "a scientific conclusion is composed of facts and ideas" (W2: 340), but also that the process of unification of facts under general ideas must be grounded in historical and practical familiarity with those facts. However, since historical and practical knowledge do not attain certainty, a formal analysis of the inferential structures of science becomes even more pressing, as a necessary companion to reasoning able to assess the validity of arguments.

The epistemological position of Whewell constitutes, as I showed in sec. 1.2, also a neglected source of Wundt's early philosophical psychology. Thus, Peirce's early enthusiastic adoption of Wundt's inferentialism effectively transposes an epistemological framework into a psychological domain, making the question of the unification of scientific facts one and the same with the question of the unification of perceptual data. The higher-order processes of cognition and the perceptual processes happening unconsciously follow at bottom the same logical structure: that of an inference, sometimes characterised as induction and sometimes as hypothesis.

The hypothetical role assumed by induction in Whewell's epistemology emerges already from a description of its task – namely, that of bringing in new conceptions to unify existing observations in a meaningful way. It is reinforced however when one looks at some of Whewell's proximate sources, particularly at the epistemological reflections of Scottish common-sensists Thomas Brown and Dugald Stewart. Both emphasised the role of hypothesis as a legitimate component of scientific inquiry and the task of philosophy of science in providing an understanding of the process of science which could foster the advancement of knowledge – i.e., to discovery.

Through Whewell and Wundt, the epistemological problem of inference affirms itself as the problem of the origin of scientific and perceptual knowledge alike. Thus, Peirce's early reception of the notion of induction in Whewell and Wundt is responsible for the establishment of an early structure of "inferentialism" which connects Peirce's psychological studies with the development of his philosophy and which eventually feeds also into Peirce's metaphysical and evolutionary theories (see Ch.s 4, 5 ad 6). Moreover, Whewell's early influence on Wundt's theory of perception suggests that, in spite of the

great influence of Wundt's early psychology on the development of Peirce's epistemology, the roots of Peirce's theory of perception cannot be considered *psychologistic*. I expand on this latter point in the next chapter (Ch. 2), tracing further consequences of Peirce's early inferentialism in his "cognition" papers of 1868 and in his later (1877-8) *Illustrations of the Logic of Science*.



# Chapter 2. Further Consequences of Inferentialism: Psychologism and the Social Impulse

“Der Punct, an dem sich Philosophie und Naturwissenschaften am nächsten berühren, ist die Lehre von den sinnlichen Wahrnehmungen des Menschen.”<sup>38</sup>  
Helmholtz, *Ueber das Sehen des Menschen*, 1855: 6.

## Introduction

The present chapter explores further consequences of Peirce’s inferentialist position by looking at some of his best-known epistemological papers: the “cognition” series of 1868 and the “Illustrations of the Logic of Science” of 1877-8. The inferentialist position adopted by the early Peirce had some specificities, which at first sight may seem in opposition: on the one hand, a deep connection with physiological mechanisms, read as forms of unconscious inferences resulting in conscious sensations; on the other hand, an emphasis on the external origin of all knowledge. In Peirce’s epistemology, the notion of the external origin of all knowledge brings together objectivity and the social dimension of knowledge: Peirce famously identified truth as what resists us and is independent of us (W3: 254; 271) *and* as the final agreement of the community of inquirers (W3: 250; 284).

The use of analogies coming from physiology and the social dimension of inquiry made Peirce’s early epistemology vulnerable to allegations of psychologism. Indeed, Peirce was the first to open fire – in manuscript notes, as well as in more extended remarks – on the “psychologism” of his early writings. Consequently, many interpreters struggled to evaluate Peirce’s early epistemology and some of Peirce’s most original (and widely known) claims about the nature of inquiry. While my overall aim is to focus on the positive contributions that Peirce’s engagement with psychology brings to the understanding of his philosophy, such engagement was not always favourably seen by interpreters. According to Jeff Kasser, “most Peirce scholars hold that his most influential

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<sup>38</sup> “The point in which philosophy and natural science get closer to overlapping is the theory of human sensory perception.”

papers, *The Fixation of Belief* and *How to Make Our Ideas Clear*, both published in the late 1870's, are thoroughly psychologistic" (Kasser 1999: 501-2). Moreover, scholars also hold that Peirce eventually (by or before 1890) "repudiated the psychologism" of his early papers (Kasser 1999: 502). Thus, the first section in this chapter (2.1) focuses on clarifying the meaning of "psychologism" in relation to contemporary philosophical debates on Peirce's epistemology and, with historical hindsight, in relation to how Peirce may have used or understood it.

Once the ground is cleared from the main psychologistic objections, the next section (2.2) introduces and expands on the core claim of this chapter: that, as a consequence of his inferentialist approach to perception, Peirce was able to build a theory of knowledge in which individuals were no longer at the centre. True, the notions of "community" and "society" remain abstract in Peirce; however, they introduce a social and public dimension into epistemology. In particular, I explore the role of testimony in the construction of the self and the relation between the community of inquirers, the adoption of the scientific method and the possibility of truth. In the 1868 paper "Questions Concerning Certain Faculties Claimed for Man," Peirce argued against an epistemology based on immediate perception. Instead, it was testimony – both from others and from our senses – which would explain the onset and the maintenance of our beliefs, including our very personal idea of our self (W2: 204).

Thirdly (2.3), I bring the role of testimony in the construction of the self to bear on the reasons for choosing the method of science. In the 1877 "The Fixation of Belief," Peirce provocatively claimed that "the sole object of inquiry is the settlement of opinion" (W3: 248), an idea already present in his early (1872) draft "Of Reality (MS 200)."<sup>39</sup> He proposed four methods of fixing "opinion" or belief: (1) tenacity to one's previous opinions, (2) following some authority, (3) agreeableness with (a priori) reasons, and finally (4) scientific investigation. While neither the method of authority nor the method of agreeableness to reason can be effectively generalised, leading to their self-refutation, the method of tenacity possesses a strength similar to that of scepticism, in that it can be held consistently as long as one renounces to being influenced by others (i.e., by adopting

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<sup>39</sup> Peirce's opening to this MS runs: "Because the only purpose of inquiry is the settlement of opinion..." (W3: 40), and again: "We have maintained and proved that the sole purpose of inquiry is to produce a settled opinion." (W3: 45).

a solipsist stance). Indeed, the passage from tenacity to science cannot be warranted from the perspective of an isolated individual, as Peirce himself admits (W3: 249-50). Peirce thus introduced the notion of “social impulse,” which opens a possibility to overcome tenacity and to make the method of science more attractive. The social impulse can be interpreted as Peirce’s ultimate concession to psychologism or as a further confirmation of the external, inferential nature of our knowledge; I defend the latter interpretation.

Finally (2.4), I situate the notion of belief in Peirce’s *Illustrations* in the context of his friendship with William James (1842-1910). Peirce and James shared a course at Harvard, visited each other’s homes, and were both members of the informal “Metaphysical Club” in 1872. The notion of belief and the problem of describing the passage from one state of belief to another are highlighted as points where the interests of Peirce and James converge while their interpretations diverge. In fact, James’ rejection of the inferential analysis of perception constitutes a cornerstone of his philosophical psychology<sup>40</sup> as well as his most significant departure from Peirce’s philosophy.

## 2.1 Psychologism

In this section, I provide the philosophical and historical background to the notion of “psychologism,” which will allow us to examine two fundamental but contested notions of Peirce’s early epistemology: namely, belief and doubt and the “social impulse,” or the tendency to revise our beliefs according to the beliefs held by the people around us. Both notions have been problematised by Peirce’s classical scholarship (Murphey 1961/1993) as well as by some of his more recent interpreters (Misak 1991/2004; Short 2000). The problems and proposed solutions highlighted by the aforementioned interpreters have been recently challenged by Jeff Kasser, who argues for a non-psychologistic interpretation of Peirce’s “The Fixation of Belief” (1877) and “How to Make our Ideas Clear” (1878) (Kasser 1999) and for subtle amendments to Misak’s (1991/2004) interpretation (Kasser 2019).<sup>41</sup>

While tracing the historical and philosophical background of “psychologism,” it is important to note that “psychologism” is not a univocal concept, with different

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<sup>40</sup> As Michela Bella (2019) recently argued, James’ own philosophical psychology can best be understood with an analysis of his notion of continuity.

<sup>41</sup> In 2.3 I consider Misak and Kasser’s interpretations in relation to Peirce’s notion of social impulse.

philosophers holding different versions of it. Peirce also used this term against other philosophers and, at times, to distance himself from his own earlier positions in epistemology. Thus, I firstly give an overview of the notion of psychologism and of its history, to focus next on Peirce's own notion of psychologism. This latter point is based on Peirce's own use of the term, especially against his early epistemological papers.

The term "psychologism" traditionally refers to the relation between logic and psychology: forms of psychologism all entail a dependence of logic from psychology.<sup>42</sup> In this account, psychology and logic are envisaged as having the same object of inquiry – namely, thought – with psychology studying all kinds of thought and logic only a part (a subset) of it.<sup>43</sup> Thus, a theory is psychologistic if it derives the laws of logic from the laws of psychology. As Nicla Vassallo (1997: 152) puts it, psychologism considers the question of *how* we reason and the question of how we *ought* to reason as at least partially overlapping. Moreover, psychologism can be seen as a reduction to psychology of philosophical problems; in this sense, for example, Kant in his critical period<sup>44</sup> rejected "psychologism" in logic and in transcendental philosophy, stating that logic does not borrow anything from life (AA 9: 14) nor philosophy from psychology (KrV, A54/ B78). I return to Kant's complex relation with psychology in Ch. 3, where I illustrate Kant's grounds for refusing to psychology the status of science.

According to Martin Kusch (2020), "*Psychologism* entered the English language as a translation of the German word '*Psychologismus*', a term coined by the Hegelian Johann Eduard Erdmann [1805-1892] in 1870 to critically characterize the philosophical position of Eduard Beneke."<sup>45</sup> In spite of the German origin of the term, Martin Kusch

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<sup>42</sup> My account of psychologism in this section is a re-elaboration of Cristalli (2017).

<sup>43</sup> Wilhelm Wundt (1863) for instance stated explicitly that the object of inquiry of psychology is *thought*, "das Denken" or "der Gedanke" (Wundt 1863: 25-6). Sensations and feelings, although not strictly thought, are indivisible from thought proper (Wundt 1863: 26).

<sup>44</sup> See Capozzi 2002/2013: 191-194. In the pre-critical period, Kant's position on the relation between logic and psychology was naturalist and psychologistic, since he followed Christian Wolff (1679–1754) and adopted Georg Friedrich Meier's (1752) *Aufzug aus der Vernunftlehre* [Compendium from the doctrine of reason] for teaching. It is nature, according to Meier, which gives its laws to logic, and not the other way around (Capozzi 2002/2013: 185).

<sup>45</sup> Eduard Beneke (1798-1854), neo-Kantian "in the empiricist-psychological tradition" (Beiser 2014: 142), endorsed a fully-fledged naturalism, in which "all the higher activities of the soul –



(2020) underlines that one of the greatest influences in the early debates over psychologism was John Stuart Mill's *Logic* (1843). As Kusch states, "The fact that the psychologism dispute has become closely associated with German-speaking philosophy must not, however, blind us to the enormous influence of J.S. Mill upon both sides of the controversy" (Kusch 2020). Allegedly, both sides of the debate referred themselves back to J.S. Mill since his *Logic* contains both psychologistic and anti-psychologistic passages (Godden 2005). Because of the relatively late<sup>46</sup> onset of the psychologism dispute in the German-speaking world, J.S. Mill's psychologistic theses have to be kept in mind when seeking to understand Peirce's own anti-psychologism. As seen in 1.3, in 1869 Peirce was not particularly impressed with John Stuart Mill's epistemology especially on the topic of psychological inquiry.

In his *Logic*, J.S. Mill adopted the thesis that all laws of mind are based on "the general law of association" (Mill 1843: 856), a law which however, according to Peirce's 1869, could not be further explained within the context of a representationalist epistemology to which J.S. Mill belongs, but could be meaningfully investigated with Wundt's notion of unconscious inferences (W2: 307; see 1.3 of this work). Still, associationism does not amount to psychologism. J.S. Mill distinguished two parts in logic: as a *science* of reasoning, logic would be a description of how reasoning actually happens; as an *art* of reasoning, it would be a prescription of how we should reason (Mill 1843: 4-6). Thus, logic as a science would be closer to psychology, while as an art it would be closer to what is meant today by logic.

In *An Examination of Sir William Hamilton's Philosophy* (1865), J.S. Mill stated that "[the Science of Logic's] theoretic grounds are wholly borrowed from Psychology, and include as much of that science as is required to justify the rules of the art" (Mill

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conceiving, judging, language, understanding – arise from the action of the environment on the basic activities" (Beiser 2014: 156). Such basic activities are, according to Beneke, "all those necessary to sustain the animal life" (Beneke 1820; in Beiser 2014: 156). Although Beneke wanted to ground not just logic, but the whole of epistemology on psychology (Kusch 1995: 101), he did not lay down a full system of psychology but sketched only those parts of psychology which were functional to his philosophical enterprise (Beiser 2014: 154).

<sup>46</sup> It is only after Husserl's publication of his *Prolegomena zur reinen Logik* (1900) that the debate over psychologism gained considerable traction in German-speaking countries (Kusch 1995: 63; 98-100).

1865, 359; quoted in Kusch, 2020, §1). According to this quote, the “art of reasoning” – that is, the prescriptive study of how we should reason – is not just starting from the materials provided by the “science of reasoning,” it is *justified* in its very *rules* by psychology. Peirce’s early comment on his *New List of Categories* paper (1867) that “It may be doubted whether it was philosophical to rest this matter on empirical psychology. The question is extremely difficult” (W2: 94) reflects the uncertain boundaries between logic, psychology and epistemology at the time.

Peirce’s uncertainty in 1868 appears all the more puzzling in light of his firm rejection of the use of psychology in logic in the 1865 Harvard lectures (Kasser 1999). The *Lectures on the Logic of Science* of 1865, seen in Ch. 1, represent Peirce’s first public engagement with inferential reasoning. In it, Peirce defended syllogism, remarked how perception seems to follow an inferential structure even when working unconsciously, and reviewed some of the most famous natural philosophers of the time: August Comte, J.S. Mill, and William Whewell (see Ch. 1). Peirce’s rejection of utilising psychology as a prop for logic investigation is as anti-psychologistic as it could go, considering that the term “psychologism” had not been invented yet:

Logic has nothing at all to do with operations of the understanding, acts of the mind, or facts of the intellect. [...] But I will go a step further and say that we ought to adopt a thoroughly unpsychological view of logic... (W1: 164).

A “thoroughly unpsychological” view of logic not only is not based on the operations of the mind, but it is utterly *independent* from any *actual* mind. This means that the validity of a logic *form* – such as, for example, a syllogism – is not something that the mind *adds* in the process of reading it, rather it is something that the mind *finds*. If a syllogism is written on a board, Peirce claimed, “[its] logical character belongs to what is written on the board at least as much as to our thought” (W1: 165). And he explained:

The psychological view is that these forms are only realized in thought, and that language is essential to thought. The unpsychological view is that they are forms of all symbols whether internal or external but that they only are by virtue of possible thought. In short, I say that *the logical form is already realized in the symbol itself*; the psychologists say that it is only realized when the symbol is understood. (W1: 165-6; emphasis added).

Peirce found the “unpsychological view” preferable for the sake of inquiry and articulated three reasons for adopting it in his 1868 lectures. Firstly, according to the unpsychological view, nothing is included in the definition of logic which does not belong to logic’s special field of inquiry. Secondly, an unpsychological view of logic would make logical laws “appl[icable] not merely to what can be thought but to whatever can be symbolised in any way. And hence [an unpsychological view] extends their [the laws of logic’s] validity to all subjects of argumentation whatever” (W1: 167). Thirdly, and more interestingly from an epistemic standpoint, the unpsychological view of logic “points to a direct and secure manner of investigating the subject [i.e., thought]” (W1: 167) while psychological investigations are anything but “direct” or “secure.” What Peirce was proposing is that logic offered a better way to investigate thought than psychology itself, and conversely, that there is more to thought than what can be found with psychological analysis.

In light of this clear-cut opposition to psychologism in 1865, it seems surprising that Peirce would let himself use psychologistic arguments to define his own epistemology only three years later (in the already mentioned *New List*) or in the *Illustrations of the Logic of Science* of 1877-8. Such apparently psychologistic stances may have rung differently to Peirce’s ear, since they were based on an alternative understanding of psychological processes, which indeed made their very foundation rest on a logical law – that of inference. Nonetheless, as Peirce’s quoted comment on the *New List* paper shows, Peirce may not have been sure that his inferentialist basis was enough to build a “thoroughly unpsychological” epistemology.

In later years, Peirce returned to his early epistemology papers, especially those of the years 1877-8, condemning his youthful psychologism. Peirce’s later reflections, if taken in isolation, appear indeed as so many acknowledgements that his early theory of inquiry was indeed psychologistic. When read in context however – if only the context of Peirce’s own passages – they often show a development rather than a rejection of his previous positions, providing new insight on them. For instance, in the opening lecture of his 1903 Harvard Lectures series, what starts as a mature apology for young psychologistic errors quickly turns into expanding psychological principles into an evolutionary account of inquiry. Peirce wrote:<sup>47</sup>

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<sup>47</sup> The following passage has been noted by Jeff Kasser (1999), Vincent Colapietro (2003: 185), Murray Murphey (1961/1993: 356).

My original article [“The Fixation of Belief”] carried this back to a psychological principle. The conception of truth, according to me, was developed out of an original impulse to act consistently, to have a definite intention. But in the first place, this was not very clearly made out, and in the second place, I do not think it satisfactory to reduce such fundamental things to facts of psychology. (1903, CP 5.28).

The “psychological principle” to which Peirce linked his conception of truth in 1877 is, in 1903, an *impulse*, something which cannot be further explained and which is instead given to the reader as a “fact of psychology.” But to stop at facts and take them as ultimate ground of our knowledge was never for Peirce a recommendable epistemic attitude. Thus, Peirce continued:

For man could alter his nature, or his environment would alter it if he did not voluntarily do so, if the impulse were not what was advantageous or fitting. *Why has evolution made man's mind to be so constructed?* That is the question we must nowadays ask, and all attempts to ground the fundamentals of logic on psychology are seen to be essentially shallow. (CP 5.28; emphasis added).

The “shallowness” of grounding “the fundamentals of logic on psychology” is due in 1903 not to an acquired taste for purely formal logic (although logic can and must, when appropriate, be considered in its formal respects only); rather, stopping at psychological impulses is “shallow” because it is *reductive*, i.e. it is cutting short the path of inquiry. It does not allow to pursue the deeper question of why we believe consistency and clearness of purpose to be two essential features of successful inquiries.

The 1903 recognition that inquiry cannot stop at psychological facts does not sound any more as a rejection of such psychological facts. At the same time, this passage cannot ease the worry – clearly expressed by Murphey (1961/1993) – that there is a fundamental difference between the problem of inquiry as settling belief in a community and the “cosmological solution” (Murphey 1993: 356) that Peirce proposed in 1903.<sup>48</sup>

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<sup>48</sup> Peirce started framing his cosmological views in evolutionary terms at least since 1886. In a draft of a projected book on these issues, titled “One, Two, Three: Kantian Categories,” he similarly stated that the issue with physical constants was not so much what they were, but how they came to be as they are: “It is difficult for us to believe that any physical constant, any finite

The undeniably naturalistic aspects of Peirce's early logic may be complemented with his mature understanding of an evolving cosmos regulated by the law of mind, which I illustrate in Ch. 5, but cannot be solved by it.<sup>49</sup>

From what seen so far, it appears that for Peirce the need for a “thoroughly unpsychological view of logic” was strictly connected with the possibility to conceive logic and epistemology as autonomous from psychology. As Kusch (1995) recognizes, it is a typical feature of the psychologism debate that philosophical interpretations of what psychologism means differ considerably between each other. They all agree, however, that psychologism is a charge that a respectable philosophy should avoid, and they share the belief on the legitimacy of the psychologistic charge. Kusch (1995) calls such undisputed belief into question by treating the psychologism debate also as a chapter in the sociology of philosophical knowledge,<sup>50</sup> which has to be understood as a non-reductionist project in which the sociological and historical strands of the psychologism debate are integral to its philosophical discussion (Kusch 1995: 23). In such a context, the philosophical question of psychologism feeds into a broader discussion on the relation between the two disciplines at all levels – methodological but also institutional.

In the end, psychologists were just as concerned with the autonomy of their discipline as philosophers.<sup>51</sup> While philosophers were generally wary of psychological

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quantity in nature, is primordial. It may be so, but we cannot help at least asking how it came to have the precise value that it has” (W5: 292).

<sup>49</sup> Murphey (1993: 356) wrote: “And even if the doubt-belief theory were maintained in regard to human *individuals*, it cannot be held true of mind in general, for it is scarcely plausible to say that the evolution of the laws of nature results from the desire of the universal mind to escape from doubt. Thus although the cosmology seems to solve Peirce's problems concerning the relativity of logic, in fact it raises more serious problems, for it involves a theory of inquiry very different from that of the 1870's.” Emphasis added. As I argue in 2.3, the theory of inquiry of 1877-8 has to be understood in light of the role of society in settling our beliefs, rather than by trying to justify why any *individual* would need the scientific method to settle their beliefs.

<sup>50</sup> Kusch's methodological sources are David Bloor, Harry Collins, Bruno Latour. For Kusch's methodological discussion, see Kusch 1995: 23-9.

<sup>51</sup> Kusch highlights how such concerns about the specificity of philosophy and/or of psychology were motivated also by the fact that, at the turn of the nineteenth century, experimental psychologists and philosophers were in competition for the same university chair – that of philosophy: see Kusch 1995: 190-7; 202.

influences in logic and epistemology, psychologists too were defining their discipline also by gradually rejecting philosophical elements from it. From the 1870s onwards Wundt rejected the notion of inferential processes unifying and explaining psychical processes as too philosophical (Araujo 2016: 87; see also Ch. 1). William James, in his 1884 “On Some Omissions of Introspective Psychology” emphasised the shortcomings in which psychologists could fall in their analysis of perception because their philosophical orientations – be they empiricism, associationism, transcendentalism, rationalism – were allowed to precede the observation of psychological phenomena (James, W1: 990-992).<sup>52</sup> Wilhelm Wundt went so far as to introduce an opposite and parallel term to “psychologism” – i.e. “logicism” [*Logizismus*] – to describe the attempt to reduce psychological problems to logical problems: “Psychologism wants to turn logic into psychology, logicism wants to turn psychology into logic” (Wundt 1910: 516; Kusch 1995: 91).<sup>53</sup> Peirce, with his enthusiastic adoption of unconscious inferences in perception, would thus be considered a “logicist” from Wundt’s (and James’) perspective. In the next section, I illustrate the inferentialist basis of Peirce’s 1877-8 epistemology as contained in what James called his “very acute and original *psychologico-metaphysical articles*” of 1868 (Perry 1936: 534. Emphasis added).

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<sup>52</sup> Interestingly, this first generation of psychologists-philosophers (Wundt and James) did not reject the philosophical component of their research at an institutional level, i.e. they did not favour the institutional separation of psychology from philosophy. Clearly, they saw psychological research as a stimulus for philosophical speculation, and vice versa. See Kusch (1995: 194-5) for Wundt’s “worry that an institutional split between philosophy and psychology would soon turn experimental psychologists into mere artisans” and Francesca Bordogna 2008: 59-90 on James’ interdisciplinarity.

<sup>53</sup> What Wundt meant here with “logicism” is obviously not the logical foundations of mathematics, but rather the intellectualist and philosophical approach to psychological problems that he himself had adopted in his early years, when he equated perception with unconscious inferences. Perception, in the intellectualist perspective, is considered in its logical and conceptual components rather than in its own terms.

## 2.2 Inferentialism

In his 1868 “cognition” papers, Peirce used the whole arsenal of Wundt’s inferential theory of perception to refute the claim that “intuition,” i.e. immediate knowledge, is anything like a faculty of the human mind. Indeed, perception as inferential and the public dimensions of inquiry are constructed by Peirce as two sides of the same coin. The 1868 “cognition” papers are “Questions Concerning Certain Faculties Claimed for Man” and “Some Consequences of Four Incapacities.”<sup>54</sup> I draw from both of them and from some drafts (now published in Peirce’s *Writings*, v. 2) of the same year to illustrate Peirce’s argument for the inferential nature of perception and its epistemic consequences.

The crucial aspect of Peirce’s theory of cognition in 1868, connecting all the points of his anti-Cartesian stance, is the inferential nature of all kind of knowledge: from reasoning to perception to the unconscious processing of sensory stimuli into sensations, the structure of cognition is inferential. In a manuscript from 1866, Peirce challenged the idea that sensation is something immediate, directly intuited by showing that even what appears as most fundamentally immediate – such as a colour sensation – is in fact the result of a complex process:

Colour is sometimes given as an example of an [immediate] impression. It is a bad one; because the simplest colour is almost as complicated as a piece of music. Colour depends upon the relations between different parts of the impression; and, therefore, the differences between colours are differences between harmonies; and to see this difference we must have the elementary impressions whose relation makes the harmony. So that colour is not an impression, but an inference. (W1: 515-6).

The consequences that this inferential model of perception can bring to epistemology are deep. If so-called “simple” sensations, like seeing a colour, or hearing a tone, are shown to be the outcome of a much more complex process of analysis, comparison, and inference, then these sensations can no longer be taken for granted as first premises of our knowledge. In fact, they may now appear to us as *conclusions* of

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<sup>54</sup> The “cognition” series counts another paper, issued in 1869: “Grounds of Validity of the Laws of Logic.”

entirely different chains of inferences, of which we cannot have any knowledge but indirectly, through scientific research and experiment.

Peirce translated in epistemological terms the physiological observation that sensations present to our consciousness are in fact the result of unconscious elaboration. In “Questions Concerning Reality” (1868), a draft of the more famous “Some Questions on Four Incapacities” (1868), he described the development of logical insight in time in analogy with the idea that what appears initially as a “first” element of consciousness is in fact a *result*:

Indeed it may be said generally that each age pushes back the boundary of reasoning and shows that what had been taken to be premises were in reality conclusions. (W2: 166).

In this perspective, Peirce’s psychological fight against immediate perception is also a fight against an epistemology based on the “myth of the given,” or the idea that there are indubitable starting points of cognition. Perception constitutes one of these “starting points”: it was therefore of primary importance to show that perception, too, is the result of a process.

In “Questions Concerning Certain Faculties,” Peirce is chiefly interested in dismantling the idea of immediate cognition, i.e. that something may be immediately given to consciousness without any process mediating between the object and the mind. The “Questions Concerning Certain Faculties” paper and the following, “Some Consequences of Four Incapacities,” have been extensively analysed in the scholarship because it is in these two works that Peirce introduces his semiotic theory. However, few have noticed the connection between Peirce’s statement “man is a sign” (W2: 241) and the inferential physiology and psychology endorsed in the essays; or between the systematic analysis of perception and thought alike as inferences and the claim that all cognition happens in signs.

For Thomas Short (2007), Peirce’s recourse to a “number of empirical facts” in his analysis of human faculties is methodologically unjustified. Short would have the “empirical facts” explained away either as a parody of arguments based on a-priori deductions – “the foundationalist presumption that a methodology should be established from a position of factual ignorance” – or as a stylistic accident: Peirce “delighted in baroque archness” (2007: 33). Eventually, for Short, “That all thought is in signs hardly



depends on the narrow train of reasoning Peirce developed in these essays” (2007: 34). Indeed, while Peirce’s engagement with experimental psychology does not constitute a *semiotic* explanation of this theory of signs, the question of the connection between Peirce’s philosophy and his scientific practice remains untouched by Short’s approach.

Vincent Colapietro (2003), in an essay on Peirce’s critique of psychologism, also touches upon the 1868 essays. After reviewing a series of early declarations of Peirce against psychologism, Colapietro synthesises the gist of the argument: “The physiological, psychological, and other processes accompanying or enabling the transformation of signs by which inferences are actually drawn by human beings in the actual circumstances of their intellectual lives are *irrelevant to the* assessment of the *validity* of these inferences” (2003: 165; emphasis added). Distinguishing the validity of an argument from its structure does not mean, however, to overlook the special relation that Peirce institutes between psychology, physiology, and logic in semiotic. Thus, Colapietro perceptively asserts: “Peirce widened the scope of logic, making it coextensive with a general theory of signs. In addition, he refined the formal object of experimental psychology, making *it* much wider than the study of consciousness (2003: 170; emphasis of the text). Colapietro’s attitude is not that of drawing boundaries around each department of inquiry, rather to appreciate their overlapping as much as their epistemological autonomy.

The 1868 “cognition” essays offer an abundance of instances in which the connection between the inferential nature of perception and Peirce’s semiotic theory of cognition comes to the fore. In “Questions” we find an illustration from ordinary experience, such as recognising the texture of a certain cloth by feeling it:

A man can distinguish different textures of cloth by feeling; but not immediately, for he requires to move his fingers over the cloth, which shows that he is obliged to compare the sensations of one instant with those of another. (W2, 197).

We are normally unaware of the need to compare different stimuli in order to perceive a distinct quality but – Peirce argued – we can come to see this inferential structure at work in perception when reflecting upon it. In the subsequent paper “Consequences of Four Incapacities” (1868) Peirce argued against the immediacy of visual perception with an example from physiology:

[We] often think that something is presented to us as a picture, while it is really construed from slight data by the understanding. [...] That the picture is not painted on the nerves of the retina is absolutely certain, if, as physiologists inform us, these nerves are needle-points pointing to the light and at distances considerably greater than the minimum visible.<sup>55</sup> [...] If, then, we have a picture before us when we see, it is one constructed by the mind at the suggestion of previous sensations. (W2: 235).

Reasoning from the complexity of the sensory data to the unity and simplicity of the sensation of colour, Peirce concluded that this process had the nature of an inference. The process necessary to become aware of a perceptual quality was, according to Peirce, an inferential process (W2: 197).

Once established that perception cannot but be inferential, Peirce drew some important consequences. The most interesting one is that perception and reasoning are seen as sharing their fundamental structure, being differentiated only by the fact that in cognition inferences are accompanied by consciousness, while in perception they are not. Peirce is thus laying the ground for a thoroughly continuistic theory of cognition, encompassing perception and reasoning alike, which will be experimentally tested in his famous psycho-physical experiment of 1884 (see Ch. 4) and further developed in his metaphysical papers of 1890s (see Ch. 5). By appealing to the methodological principle of testing any hypothesis to its limit before introducing new ones, Peirce argued that all phenomena had to be conceived as the product of a valid inference:

...we must [...] reduce all kinds of mental action to a general type. [...] We must begin, then, with a process of cognition, and with that process whose laws are best understood and most closely follow external facts. This is no other than the process of valid inference [...]. Something, therefore, takes place within the organism which is equivalent to the syllogistic process. (W2: 214; emphasis added).

The same idea is restated further (W2: 221). The idea that all mental action is like a kind of inference was, for Peirce, an established thesis, a belief from which the rest of

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<sup>55</sup> The same point (almost same wording) is also made in Peirce's previous essay, "Questions Concerning Certain Faculties Claimed for Man," W2: 198.

his inquiry would be built. In the “Fixation” paper, Peirce illustrated it mostly with references to physiology, while in the 1868 “cognition” papers Peirce also resorted to psychological arguments, i.e. arguments stemming from an analysis of the faculties of attention, sensation, and understanding. While attention is considered a kind of induction by simple enumeration (W2: 232), in the case of sensation something new is effectively introduced, making its underlying inference more similar to hypothesis:

... a sensation is a simple predicate taken in place of a complex predicate; in other words, it fulfils the function of an [sic.] hypothesis. (W2: 228).

This last passage is particularly important for my purposes because it highlights the connection between an inferential and semiotic account of perception, on the one hand, and Peirce’s theory of inquiry on the other hand. In fact, inquiry and perception are a continuous enterprise of hypothesis formation finalised to the creation of beliefs (or dispositions); this idea will be further articulated by Peirce in his paper “The Fixation of Belief,” which I analyse in the next section.

Not just sensations are the product of inferences. In “Questions Concerning Certain Faculties,” Peirce argued that “self-consciousness may easily be the result of inference” (W2: 204).<sup>56</sup> According to Peirce, the feeling of our own existence, which may seem at first a most certain and indubitable fact of immediate perception, can be shown to derive from the continuous corroboration of testimony from others as well as from our senses. While none of these testimonies, taken singularly, can reach the same degree of certainty that the feeling of our own existence possesses, yet – Peirce argued – this feeling is the product of the continuous stream of reassuring testimonies (W2: 203).

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<sup>56</sup> Richards (1980: 53) notes that Wundt used the thought experiment of the baby to illustrate how consciousness emerges as a result of inferences: “According to Wundt’s early theory, consciousness results from a series of unconscious inferences of continually greater complexity and comprehension. Initially the infant suffers a confusion of sensations [...]. As colligations of sensations become fused and a spatial framework is gradually constructed, the child begins to distinguish here from over there. At this point, it can start sorting out two different kinds of sensations, those qualia impressed from over there, which are constantly changing, and those felt intensities that remain tied to its bodily here. [...] With this primitive separation [...] consciousness emerges.” See Wundt (1863: 288): „Dem Kinde ist der eigene Leib zunächst nur ein von allen andern Gegenständen seiner Erfahrung geschiedenes Ding, das durch ganz bestimmte Merkmale von allen sonstigen Erfahrungen geschieden werden muß.“

Peirce built his argument from the thought experiment of observing the development of the idea of “self” in the child:

It is first to be observed that there is no known self-consciousness to be accounted for in extremely young children. It has already been pointed out by Kant that the late use of the very common word “I” with children indicates an imperfect self-consciousness in them, and that, therefore, so far as it is admissible for us to draw any conclusion in regard to the mental state of those who are still younger, it must be against the existence of any self-consciousness in them. On the other hand, children manifest powers of thought much earlier. Indeed, it is almost impossible to assign a period at which children do not already exhibit decided intellectual activity in directions in which thought is indispensable to their well-being. (W2: 202)

Thus, Peirce argued, the child experiences the world before having an idea of self. In Peirce’s account, the idea of self is developed in the child gradually, encouraged by the testimony of others and by the experience of error:

“[For the child] testimony is even a stronger mark of fact than the facts themselves, or rather than what must now be thought of as the appearances themselves” (W2: 202; emphasis of the text).

The role of testimony is so primitive and essential in the formation of our idea of self, that consistent testimony from others remains essential throughout our life to preserve our sense of self:

I may remark, by the way, that this remains so through life; testimony will convince a man that he himself is mad. (W2: 202).

The notion of testimony developed in the 1868 “cognition” papers is built on the inferentialist theory of perception with which Peirce rejected the possibility of an absolute foundation to knowledge together with the “authority” of intuition on our beliefs (W2: 194).<sup>57</sup> Because of this foundation the notion of testimony constitutes the key to

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<sup>57</sup> Peirce wrote (W2: 194): “In the middle ages, reason and external authority were regarded as two coordinate sources of knowledge, just as reason and the authority of intuition are now; only

understand a much-debated notion of “social impulse,” which is presented in the literature as the greatest obstacle to a non-psychologicistic interpretation of Peirce’s 1877 “The Fixation of Belief.” In the next section, I analyse current criticism and proposed solutions to the social impulse in the context of Peirce’s justification of the scientific method as the best method for settling belief. My claim is that the social impulse underscores and legitimates our knowledge as much as testimony underscores and constitutes our sense of self. Both are grounded on the same inferential structure of cognition. Peirce, by rejecting the faculty of intuition and its authority greatly simplified the problem of how to bridge the gap between the self and the others and of how to understand socially produced knowledge. If perceptual and scientific knowledge alike are inferential, neither can be warranted at the level of the individual and both are in fact a collective enterprise.<sup>58</sup>

### 2.3 The Social Impulse

“The Fixation of Belief” (1877) is the first paper of a series known as the *Illustrations of the Logic of Science*. It is perhaps one of the better-known papers by Peirce (Kasser 1999). In it, Peirce individuated two fundamental epistemic states: belief and doubt. The starting point of any inquiry is always a state of belief disturbed by the unexpected appearance of doubt, and the aim of inquiry is that of “fixating” or settling belief. Peirce aimed to introduce the logic of science to readers of a “popular” magazine (the *Popular Science Monthly*). He outlined a method of science which is a mixture of verification and discovery (i.e., finding that something is the case and finding that “something” which is the case). Verification and discovery, in the form of belief fixation, appear not as the by-product of a highly specialised activity, but rather as a fundamental drive of animal behaviour.<sup>59</sup> All these ingredients concur in making it both a revolutionary

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the happy device of considering the enunciations of authority to be essentially indemonstrable had not yet been hit upon.”

<sup>58</sup> It is interesting to note that, although Wundt dismissed his inferential theory of perception as too philosophical for empirical psychology in 1874 (see Ch. 1), he developed some of its consequences at the level of *Völkerpsychologie*, i.e. at a social level.

<sup>59</sup> Peirce also gave naturalistic reasons for the development of logic, adding that “Logicity in regard to practical matters is the most useful quality an animal can possess, and might, therefore, result from the action of natural selection; but outside of these it is probably of more advantage

paper in Western epistemology and a battle ground for upholders of an anti-psychologic view of logic. Before discussing these charges and possible solutions to them, I present a summary of the contents of the paper.

The “Fixation” paper is articulated in 5 sections. The first introduces an argument on the importance of the study of logic illustrated with historical examples; the gist of it is that the development of the scientific method and the development of logic go hand in hand, so that “each chief step in science has been a lesson in logic” (W3: 243). In particular, the introduction of the experimental method had, as its logical counterpart, a “new conception of thinking” (W2: 243) which transcended purely linguistic or conceptual dimensions and made observation and practice part of reasoning. The second section gives to the new logic modelled on experimental science the same target that Whewell had identified for the “inductive sciences” (see 1.1), namely *discovery*. “The object of reasoning is to find out, from the consideration of what we already know, something else which we do not know” wrote Peirce (W3: 244). Finding out a “fact” is contrasted by Peirce to the mere “feeling” that something is the case:

A being the premises and B the conclusion, the question is, whether these facts are really so related that if A is B is. If so, the inference is valid; if not, not. *It is not in the least the question whether, when the premises are accepted by the mind, we feel an impulse to accept the conclusion also.* (W3: 244; emphasis added).

The “facts” that would have a bearing on logic were still not the “facts of the intellect” (W1: 164) that Peirce opposed in his “thoroughly anti-psychologist view of logic” of 1865 (see Ch. 1). The more worrying sections for most anti-psychologists start with section 3. There, Peirce expands the usual characterization of the rational logician with what Ernst Cassirer (1874-1945) identified as a “voluntaristic” component: the feelings of belief and doubt.<sup>60</sup> Section 4 contains two statements which could be used in

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to the animal to have his mind filled with pleasing and encouraging visions, independently of their truth; and thus, upon unpractical subjects, natural selection might occasion a fallacious tendency of thought” (W3: 245).

<sup>60</sup> Cassirer, in his *The Philosophy of the Enlightenment*, traced the introduction of doubt and of its correlate psychological state, belief, to the sensuous empiricism of Condillac: “Uneasiness (inquiétude) is for him [Condillac] no merely the starting-point of our desires and wishes, of our

support of a psychologistic interpretation of the whole text: “The irritation of doubt causes a struggle to attain a state of belief. I shall term this struggle inquiry [...]” (W3: 247); and the even stronger “the sole object of inquiry is the settlement of opinion” (W3: 248).

With those statements, Peirce aimed to debunk the idea that the starting point of inquiry is some neutral, perfectly indifferent point of balance – the void of the “I think” that René Descartes (1596-1650) would have reached in his *Meditations* (1641) after doubting everything.<sup>61</sup> Against Descartes, Peirce protested that inquiry cannot start with hyperbolic doubt; instead, doubt, to be useful, “must be a real and living doubt” (W3: 248). In the 5<sup>th</sup> and last section, Peirce detailed four methods generally used for settling opinion, exposing their advantages and disadvantages. These methods are (1) the method of tenacity, (2) the method of authority, (3) the method of “agreeableness to reason” (W3: 252) or spinning theories from one’s own head, and finally (4) the method of science. Peirce declared that “Everybody uses the scientific method about a great many things, and only ceases to use it when he does not know how to apply it” (W3: 254); thus, besides arguing for the adoption of this latter method in the “Fixation” paper, Peirce’s overall project in the *Illustrations* can be evaluated in light of its efficacy in showing how the scientific method can be applied to a variety of problems.

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willing and acting, but also of all our feeling and perceiving and of our thinking and judging, indeed of the highest acts of reflection to which the mind can arise. [...] Cartesian psychology [...] is thus reversed. Here we meet for the first time with that voluntaristic tendency whose development can be traced through Schopenhauer in the field of metaphysics and the theory of modern pragmatism in the field of epistemology” (Cassirer [1931]1951/2009: 103). Apart from the controversial interpretation of pragmatism as a philosophy based on “voluntarism,” it is interesting to pursue this connection with Condillac and particularly the thread that connects Peirce’s theory of inquiry with theories of perception: “It remained to be shown that this uneasiness is the first principle which gives us the habits of touching, seeing, hearing, feeling, tasting, comparing, judging, reflecting, desiring, loving, fearing, hoping, wishing; and that, in a word, it is through uneasiness that all the habits of the mind and body are born.” (Condillac, *Extrait Raisonné*, p. 34. Quoted in Cassirer 2009: 103, footnote 17).

<sup>61</sup> Peirce was not interested in delivering a fine-grained criticism of the historical Descartes, rather he used him as a proxy for some engrained philosophical preconceptions which stemmed from the Cartesian school, such as the (connected) ideas that knowledge must have a foundation and reach certainty. Susan Haack (1982: 166) even finds “affinities between Descartes’ method and Peirce’s ‘critical commonsensism’.”

The evaluation of Peirce's project has been sometimes quite harsh. Douglas Anderson (1995), in his commentary to "The Fixation" paper, maintains that the text presents an unresolved conflict between the practical and theoretical sides of settling a belief. For the practical side, removing the irritation of doubt and reaching a state of belief is all that inquiry is about. For the theoretical side, the ultimate goal of inquiry is truth. According to Israel Scheffler (1974), the first three methods of fixing belief presented by Peirce are discussed "in light of their ability to settle belief," whereas the fourth – the method of science – is discussed in light of its ability of ultimately reaching the truth (quoted in Anderson 1995: 70-1). Anderson himself maintains that "...these considerations at best temper the tension in the essay and do not resolve it. We must see "Fixation" as 'on the way' to Peirce's later works" (Anderson 1995: 86).

Anderson explicitly follows in this a statement of Hookway (1993: 18), according to whom the "Illustrations" lack a good argument for "his [Peirce's] philosophical system" because Peirce had not developed his semiotic theory yet.<sup>62</sup> In fact, Hookway's (1993) broader argument is rather a vindication of the role of belief – in the form of confidence, and of the priority of life-choices over epistemology – than a condemnation of it.<sup>63</sup> Nonetheless, what matters for our purposes now is that even Anderson, who takes the "Illustrations" seriously, argues that they present severe faults, which no interpretative effort can overcome.

Cheryl Misak (2004) also follows Sheffler's distinction between Peirce's four methods in inquiry and devotes two separate chapters to analyse the method of science in relation to settling belief (Ch.2) or to reaching the truth (Ch. 4). Misak rightly analyses the problem of settling belief in the broader context of habit-taking and, while

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<sup>62</sup> Hookway (1993, 18): "Part of the story is that at the time of writing the "Illustrations of the Logic of Science," Peirce was unable to give his philosophical "system" the systematic grounding in semiotics and the theory of the categories that it required: hence, he was groping for arguments for positions that he was reasonably confident were correct but he lacked systematic support for."

<sup>63</sup> Hookway (1993: 25): "The scientist must be confident that the life of science is a possible one, that it can be (and will be) a rewarding one, that the contributions he or she is making are of value, and so on: this must be full belief, because it has to determine action in response to vital questions - it determines how the individual decides to live. We see here, once again, the limitations to the perspective that Peirce had obtained when he wrote "The Fixation of Belief." Reading that paper suggests that adoption of the method of science is the only possibility...".



underscoring a few times that belief must not to be understood in a psychologistic sense, she does not engage with arguments on Peirce's psychologism. This task is taken up by Jeff Kasser (1999; 2019), who argues "that Peirce remained an antipsychologistic logician throughout his career and that he never repudiated ["The Fixation of Belief"] and ["How to Make our Ideas Clear"] as psychologistic" (Kasser 1999: 502). Eventually, it is the role of the "social impulse" in settling belief that constitutes the common challenge for both Misak and Kasser's readings.

The social impulse plays a key role in the economy of Peirce's "Fixation" paper since it is the only "argument" that Peirce urges against the adoption of the method of tenacity for settling belief. The method of tenacity consists in holding on to whatever opinion one already possesses or finds agreeable holding, disregarding any evidence to the contrary. Peirce rhetorically asked:

If the settlement of opinion is the sole object of inquiry, and if belief is of the nature of a habit, why should we not attain the desired end, by taking any answer to a question which we may fancy, and constantly reiterating it to ourselves, dwelling on all which may conduce to that belief, and learning to turn with contempt and hatred from anything which might disturb it? This simple and direct method is really pursued by many men. I remember once being entreated not to read a certain newspaper lest it might change my opinion upon free-trade. (W3: 248-9).

Besides being "really pursued by many men," the method is theoretically infeasible, since those who successfully adopt the method of tenacity will indeed not have their beliefs shaken by any doubt. In an unusual move for a philosopher, Peirce chose not to criticise those who adopt its method because of its "irrationality": such a criticism, Peirce maintained, is not substantial and only reveals that we do not share the method (or the belief) that someone else is so strongly embracing:

A man may go through life, systematically keeping out of view all that might cause a change in his opinions, and if he only succeeds – basing his method, as he does, on two fundamental psychological laws<sup>64</sup> – I do not see what can be said against his doing so. *It would be an egotistical impertinence to object*

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<sup>64</sup> To the best of my knowledge, these laws have not been identified.

*that his procedure is irrational, for that only amounts to saying that his method of settling belief is not ours.* (W3: 249-50; emphasis added).

Kasser (1999: 503) and Misak (1991/2004: 56-7) agree in finding that the method of tenacity, coupled with the idea that one should choose a criterion to settle belief based on its efficacy rather than more traditional ideals for inquiry – i.e., truth – is a challenge for non-psychologistic interpretations of the “Fixation” paper. Peirce’s proposed solution – the “social impulse” – is also seen as unconvincing. Peirce stated:

But this method of fixing belief, which may be called the method of tenacity, will be unable to hold its ground in practice. *The social impulse is against it.* The man who adopts it will find that other men think differently from him, and it will be apt to occur to him, in some saner moment, that their opinions are quite as good as his own, and this will shake his confidence in his belief. This conception, that another man's thought or sentiment may be equivalent to one's own, is a distinctly new step, and a highly important one. It arises from *an impulse too strong* in man to be suppressed, without danger of destroying the human species. Unless we make ourselves hermits, we shall necessarily influence each other's opinions; *so that the problem becomes how to fix belief, not in the individual merely, but in the community.* (W3: 250; emphasis added).

The problem that interpreters usually have with the social impulse are related both to its being *social* and its being *an impulse*. If the method of science prevails on the method of tenacity only because of some social contingency – for instance, the fact that we happen not to be hermits – then its success would depend on social, rather than epistemic, reasons. If, on the other hand, we cannot escape the method of science because of some inner necessity – an “impulse” – then it would seem that the adoption of the method of science can only be justified upon psychologistic reasons, and this would compromise Peirce’s whole epistemic project.

Kasser (1999: 520) proposes the following solution: the social impulse is an ultimate fact of experience, and as such it is no more psychologistic than belief and doubt, or indeed common-sense. Common sense is admitted both by Peirce and by contemporary philosophy, therefore Peirce’s adoption of the social principle is not a psychologistic move. In addition, in his 2019 paper Kasser presents the social impulse as a “defeater” of

settled belief (Kasser 2019: 15): in this context of continuous confrontation, the method of science would be the one producing “less brittle” beliefs (Kasser 2019: 16).

Kasser’s suggestion is indeed ingenious and I agree that the social instinct can be observed in action in ordinary situations; however, there is no need to treat it as an ultimate fact of experience, especially since the whole of Peirce’s epistemological project is built around the rejection of the existence of such ultimate facts.<sup>65</sup> Moreover, if the social impulse can be acknowledged by common sense observation, it still remains an impulse, i.e. a psychical or biological fact. My claim is that the social impulse is, indeed, an impulse, however this does not make Peirce’s argument psychologistic. The reason is twofold: (1) from the perspective of its being an *impulse*, it can be accommodated in the inferential, non-psychologistic account of perception that Peirce upholds since his reading of Wundt (see Ch. 1) and that he illustrated in his 1868 “cognition” essays (see 2.2); secondly, (2) when stressing the *social* character of the social impulse, the benchmark for Peirce’s notion of scientific method is set by the *essentially public* dimension of rationality and inquiry, which Peirce took from Kant and Whewell (W2: 342).

## 2.4 Between Peirce and James: Belief

A last issue connecting psychologistic worries and the public dimension of Peirce’s theory of inquiry is Peirce’s analysis of the notion of belief. Peirce constructed belief with reference to the inferential structure of sensation (as seen in the 1868 essays “Questions Concerning Certain Faculties Claimed for Man” and “Some Consequences of Four Incapacities”) but also – in “The Fixation of Belief” – by connecting belief and doubt with specifically physiological analogues:

Doubt is an uneasy and dissatisfied state from which we struggle to free ourselves and pass into the state of belief; while the latter is a calm and satisfactory state which we do not wish to avoid, or to change to a belief in anything else. On the contrary, we cling tenaciously, not merely to believing, but to believing just what we do believe. [...] [Doubt] reminds us of the irritation of a nerve and the reflex action produced thereby; while for the analogue of belief, in the nervous system, we must look to what are called

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<sup>65</sup> As I illustrate in Chapters 5 and 6, for Peirce the point of viewing a certain kind of facts as part of common-sense experience was that of making them open to further inquiry.

nervous associations—for example, to that habit of the nerves in consequence of which the smell of a peach will make the mouth water. (W3: 247).

Nonetheless, according to Misak and Kasser, belief is a legitimate epistemic state which has to be understood in relation to the notion of habit; Peirce’s “naturalism” (Misak 2004) – i.e., his illustrating belief with examples from physiology – should not compromise the possibility to talk philosophically about inquiry, from the perspective of what it means for inquiry to be an alternation of doubt and belief rather than from the perspective of the underlying physiological structures of doubt and belief.<sup>66</sup>

A widely recognised background source for Peirce’s notion of belief is the Scottish philosopher Alexander Bain (1818-1903).<sup>67</sup> Bain’s theory of belief was that belief is a disposition to act (Fisch 1954/1986: 82).<sup>68</sup> In 1893, Peirce wrote that Bain’s books “were of the utmost service in their time in leading young men to a scientific way of thinking about psychology. Many of those men, no longer young, gratefully estimate Bain’s powers by their own indebtedness to him” (MS 400; quoted in Fisch 1954/1986: 88). Peirce utilized Bain’s notion of belief for epistemic purposes; however, the anti-psychologism of Peirce’s work should not blind us to the impact of Peirce’s epistemology in psychology.

In the remainder of this chapter, I explore the impact of Peirce’s epistemology on psychology and on his friend William James (1842-1910), psychologist and philosopher, who would later credit Peirce as the founder of pragmatism. Their mutual influences can however be traced to much earlier years. In particular, Peirce’s notion of belief resonated

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<sup>66</sup> For the purposes of this chapter, I leave reductionism and related questions aside.

<sup>67</sup> Fisch (1954/1986: 83); Murphey (1961/1993: 161) in fact endorses the view that Peirce’s notion of belief is entirely derivative to Bain’s: “There are several reasons why Bain’s theory should have had a special appeal for Peirce. In the first place, the theory is in many respects easily combined with Peirce’s earlier theory of cognition as outlined in the papers of 1868. [...] Even more important, however, is the similarity between Peirce’s theory of reality and Bain’s doctrine. In both cases the aim of inquiry is the production of an agreement. [...] again Bain’s theory completes and extends Peirce’s own.”

<sup>68</sup> Bain’s theory of psychology appeared in two volumes – *The Senses and the Intellect* (1855) and *The Emotions and the Will* (1859). As Max Fisch (1954/1986: 88) reported, “*The Senses and the Intellect* appeared in the year in which Peirce entered Harvard College, and *The Emotions and the Will* in the year of his graduation.”

with James' notion of "faith;" furthermore, Peirce's description of the alternation between belief and doubt may have its share of influence – together with Hodgson's<sup>69</sup> 1878 book *The Philosophy of Reflection* – on James' formulation of the notion of stream of thought in 1884. I support this claim with a reconstruction of Peirce and James' early acquaintance and with an analysis of the belief-doubt dynamics as they appear in Peirce's second paper of the *Illustrations of the Logic of Science* series, "How to Make our Ideas Clear" (1878).

James and Peirce met for the first time at the Lawrence Scientific School, on the chemistry program; however, Peirce was graduating the year James started the course. They started seeing each other more often in 1866, when James' family moved to Cambridge and the young Peirce was "admitted to the family circle" (Perry 1936: 533). According to James' biographer Ralph Barton Perry (1876-1957), James was following Peirce's progress very closely:

During the late '60s James heard Peirce's Lowell Lectures on the philosophy of science, read his "very acute and original *psychologico-metaphysical articles*" in the *Journal of Speculative Philosophy*, and talked over both lectures and articles with him in private. (Perry 1936: 534. Emphasis added).

James saw a correspondence between psychology and metaphysics in Peirce's 1868 "cognition" papers, and his judgement is correct. Moreover, James was decidedly impressed by Peirce's personality. They both joined the 1872 "Metaphysical Club," a discussion group connecting young men who would have become important personalities of their time. The group gravitated around the figure of Chauncey Wright (1830-1875).<sup>70</sup>

Wright adopted Bain's text – probably the 1868 compendium – as textbook in 1870 when commissioned to read psychology at Harvard (Fisch 1954/1986: 89). In 1876 James reviewed the third edition of Bain's *The Emotions and the Will* – a particularly significant edition because of the emphasis on relations and of the addition of an essay by Grote on Aristotle's psychology; and eventually, James adopted "Bain's *Senses and Intellect* and his *Emotions and Will* as textbooks in his psychology course [1878-1879] at the department of philosophy" (Fisch 1954/1986: 92).

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<sup>69</sup> Shadworth Hollway Hodgson (1832-1912) was a very influential Victorian philosopher.

<sup>70</sup> On Chauncey Wright more broadly in and especially on his connection with Darwin's theory of evolution, see Andrea Parravicini (2012).

Thus, Bain was a common source of Peirce and James' notion of belief. Besides, James had been long inclined to assign an important role to "faith" – used with the same meaning as "belief" – in inquiry. James drew this connection in a notebook entry of 1862:

We cannot live or think at all without some degree of faith. Faith is synonymous with working hypothesis. (James 1862; in Croce 2017: 46).

Paul Croce, who recently (2017) wrote a biographic account of James' formative years, argues that the concepts of "faith" and "belief" allowed James and Peirce to go beyond a schematic description of inquiry with pure "facts" on the one side and pure subjectivity on the other (Croce 2017: 46). Faith and belief play a crucial role in enabling scientists to hold a hypothesis or to trust their doubts. Indeed, for Peirce and James science is about hypotheses: their clarification and their testing, but also their inception.

In his 1879 essay "The Sentiment of Rationality," James also incorporated the idea of inquiry as a transition from the irritation of doubt to the stability of belief, in terms very similar to those used by Peirce in his 1877 "Fixation": "The transition from a state of puzzle and perplexity to rational comprehension is full of lively relief and pleasure...". To this, James added physiological considerations to emphasise how feelings in general depend "not on simple discharge of nerve-currents, but on their discharge under arrest, impediment or resistance" (WWJ 1978: 32-33).

Peirce's own analysis of the process of belief-doubt alternation is detailed in the second paper of his *Illustrations* series, "How to Make our Ideas Clear" (1878). Peirce started by summarizing his previous exposition of belief in a definition:

First, it [belief] is something that we are aware of; second, it appeases the irritation of doubt; and, third, it involves the establishment in our nature of a rule of action, or, say for short, a habit. (W3: 263).

Belief thus involves (1) consciousness of it, (2) a feeling of calm and satisfaction, and (3) a propensity to act if certain circumstances arise. Bain's definition of belief as a propensity to act is contained in point (3), however Peirce added further qualifications to it. Belief is not just projected towards the future, but it is also a state of consciousness which presents itself as the culmination of the previous condition of doubt and, at the same time, as its transformation. Belief and doubt are thus analysed from the point of view of a process (as the title of his previous essay suggested – "The *Fixation* of Belief,"

emphasis added). In “How to Make our Ideas Clear,” Peirce described belief and doubt as two moments or phases in the movement of thought:

As it appeases the irritation of doubt, which is the motive for thinking, thought relaxes, and *comes to rest for a moment when belief is reached*. But, since belief is a rule for action, the application of which involves further doubt and further thought, *at the same time that it is a stopping-place, it is also a new starting-place for thought*. (W3: 263. Emphasis added).

The belief-doubt alternation is compared here to the alternation of a state of relaxation and a state of activity. Belief is a relaxed state for thought, which has been engaged in the “struggle” to attain belief caused by doubt; at the same time, belief is a state of receptivity from which thought could be dislodged by a new doubt. Peirce further claimed that, in going from doubt to belief, we observe in consciousness “two objects”, namely sensations and thoughts. Sensations are what we are *immediately* conscious of, whereas we are only *mediately* conscious of thought. Sensations are states of consciousness, “completely present at every instant so long as they last,” while thoughts “are actions having beginning, middle, and end, and consist in a congruence in the succession of sensations which flow through the mind” (W3, 262). As evidenced earlier, however, sensations are not “first” or ultimate building blocks of experience, since they are themselves the product of unconscious inferences from our sense organs (see 2.2). This “congruence in the succession of sensations” was compared by Peirce to a “thread of melody” (W3: 263). Thought is no more the sum of sensations than a melody is the sum of its notes. For both thought and the melody, meaning resides in the unity of the process that produces them, in their coherent stretch across the individual moments of sensation or the duration of the single notes.

Peirce’s analysis of the belief-doubt-belief process as a moment of thought encompassing relaxation-irritation-relaxation, or rest-struggle-rest, closely reminds of William James’s own description of the “stream of consciousness” (or “stream of thought:” for James, consciousness and thought are synonymous) firstly published in 1884, in the paper “On Some Omissions of Introspective Psychology” (James W1: 986ff.). This paper is a first published version of the idea of “stream of thought” which will find full articulation in the *Principles of Psychology* (1890). In the 1884 paper, James wrote:

When we take a rapid general view of the wonderful stream of our consciousness, what strikes us first is the different pace of its different portions. *Our mental life, like a bird's life, seems to be made of an alternation of flights and perchings.* [...]. Let us call the resting-places the “substantive parts,” and the places of flight the “transitive parts,” of the stream of thought. *We may then say that the main end of our thinking is at all times the attainment of some other “substantive” part* than the one from which we have just been dislodged. (James 1884: 2-3, W1: 987. Emphasis added).

James envisages mental life as an alternation of swift movements and moments of rest, where our thought indulges on the object it has just reached. Such are the “substantive” parts of the stream, which are like the branch on which a bird rests and from which it springs to the next flight.

According to James’ biographer Ralph Barton Perry (1876-1957), James elaborated the notion of “stream of consciousness” from Hodgson’s notion of “minima of consciousness” (Perry 1936: 613), i.e. “states of consciousness artificially isolated for the purpose of analysis” (Hodgson 1878: 251). Hodgson’s 1878 book *The Philosophy of Reflection* indeed presented a processual, continuous account of consciousness, a “train of thoughts” which has “the form of time” (Hodgson 1878: 252) and is articulated in “presentation” and “representation” (Hodgson 1878: 261). James himself retrospectively recognised in 1910 that Peirce and Hodgson had been two major influences in the development of his own pragmatism, and Hodgson mostly for the details (LWJ, v.2: 328; quoted in Perry 1936: 612-3).

If James was initially under Peirce’s influence, he was also quickly able to take a distance from those positions of Peirce which were most at odds with his own research purposes. The first element to go was the inferential notion of perception and cognition on which Peirce had built his whole epistemology. In the paper “The Spatial Quale” (1879) but also – if more discreetly – in his 1876 Harvard lectures James distanced himself from the “usual philosophers” school of psychology, who would disregard the presentational element of perception in favour of inferences (Girel 2003: 169). There is little doubt that Peirce would be counted within the philosophers’ school.

Once rejected the inferential structure of perception, James developed his notion of stream of consciousness in a very different direction than Peirce’s, although it retained a structure of “flights and perchings” (James 1884: 2-3) similar to Peirce’s “resting



points” (W3: 263). James’s eventual articulation of thought in “transitive” and “substantive” parts in his *Principles of Psychology* (1890) sparked a series of passionate replies from Peirce, who after praising James’s theory as possibly the most significant contribution to psychology, vainly tried to suggest to his friend some terminological adjustments that would go in the direction of treating the stream of thoughts in less ambiguous terms (Girel 2003: 184-186).

The disagreement over terminology was in fact a proxy for a much more substantial disagreement over the meaning and the purpose of an analysis of the stream of consciousness: Peirce would have envisaged it as a system of relations, while James wanted to highlight the variety and the “lived experience” of the conscious life. James sought to capture the *sensation* of the transition from one “substantive” moment to the other;<sup>71</sup> Peirce, although remaining pluralistic about the possible relations that can be built on sensations, understood belief as the distinctive work of *thought* in forming relations. Thought is not the only kind of relation that is found in consciousness, but is that relation specifically oriented to the settling of belief:

...various systems of relationship of succession subsist together between the same sensations. These different systems are distinguished by having different motives, ideas, or functions. Thought is only one such system, for its sole motive, idea, and function, is to produce belief, and whatever does not concern that purpose belongs to some other system of relations. (W3: 263).

Rather than turning introspectively to the feelings of relation, Peirce tried to abstract from the complexity of their “systems of relations” the system of thought,<sup>72</sup> perhaps to explain the production of belief from a rational and logical standpoint only, or perhaps because he was following Wundt’s original identification of thought with the proper activity of the mind.<sup>73</sup> Regardless of the reason for this move, it is the move itself

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<sup>71</sup> In his 1884 paper, James credited Herbert Spencer for being the first to recognise, in his *Principles of Psychology* (1855), “feelings of relations” among the substantive parts of the stream of consciousness (Spencer 1885, §67; in James 1884: 4).

<sup>72</sup> On the role of abstraction in Peirce’s epistemology there is a vast literature. See for example Thomas Short (2007: 263-288), Cornelis de Waal (2013: 23-9), Frederik Stjernfelt (2014: 162-8).

<sup>73</sup> As illustrated in 1.2.

which is worth noticing: Peirce's attention is directed to feelings and thoughts as elements of a system of relations rather than as objects in themselves. Briefly, Peirce's move was a move away from understanding thought as personal and private. What interested Peirce was not that idiosyncratic element that so much fascinated James,<sup>74</sup> but rather the general aspect of cognition.

Peirce recognised that there is some inherent limitation or imperfection that hampers thought when examined from the point of view of the individual. From the individual's perspective however, our own logical imperfection would hardly be noticed. As discussed in the context of the "Fixation" paper, the method of tenacity may work perfectly well at the individual level and objecting to it on the grounds of its irrationality would be an "egoistic impertinence" (W3: 250). However, this does not mean that the individual perspective gains a privileged position in Peirce's epistemology: in fact, in the same paper Peirce claimed that "nothing human" could "satisfy our doubts" (W2: 253) and that reality itself – as something "entirely independent of our opinions" (W3: 254) had to be the fundamental hypothesis of every inquiry. Moreover, the possibility of affecting more than one individual, i.e. a community, was for Peirce the necessary (although not sufficient)<sup>75</sup> condition for anything to be considered "real."

Peirce's whole epistemic project is oriented towards finding ways to collectively overcome the "imperfection" that reasoning necessarily possesses at the individual level. In the 1868 paper "Further Consequences of Four Incapacities," Peirce dramatically stated that –

The individual man, since his separate existence is manifested only by ignorance and error, so far as he is anything apart from his fellows, and from what he and they are to be, is only a negation. (W2: 241-2).

This could not be further away from James' attention for the individuality of mental life. Peirce is not interested in exploring the individuality of cognition; besides,

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<sup>74</sup> I expand on James' preference for the individual in an epistemological context in Ch. 5.

<sup>75</sup> The pragmatic maxim expounded in "How to Make our Ideas Clear" is in fact the "third degree of clearness" for Peirce's interpretation of the notion of reality: "Thus we may define the real as that whose characters are independent of what anybody may think them to be. But, however satisfactory such a definition may be found, it would be a great mistake to suppose that it makes the idea of reality perfectly clear." (W3: 271).

the main consequence of Peirce's inferentialist approach is that there is no epistemic advantage associated with the individual standpoint. Importantly, however, Peirce did not completely discard the individual: with their contingent beliefs and doubts, individual people are the starting point of every inquiry. What matters for Peirce is to stress that the individual perspective cannot be adopted as a "foundation" of knowledge. Eventually, the social impulse and the inferential set-up of our cognitive faculties show that, if we need the corrective of experience to go beyond individual thought, we also need the testimony of others in order to establish the individual "I."

## Conclusion

This chapter examined traditional accusations moved to Peirce's epistemology of the years 1868-78 of being "psychologistic." Its aims were: (1) to *clarify* the philosophical content of the "psychologism" allegation, (2) to adopt a *critical* and *historical* approach to the "psychologism" allegation itself, and (3) to conduct a systematic reading of some of Peirce's key-texts in the decade 1868-78, in order to assess from a *philosophical* point of view the applicability of the psychologism allegation to Peirce's epistemology.

In my reconstruction, the epistemological claims of the *Illustrations* have to be reconsidered in the broader context of Peirce's engagement with psychology and physiology, which does not amount to a quick identification of Peirce's argument with psychologistic arguments. In fact, once the details of Peirce's engagement with psychological and physiological research are uncovered, they do not justify the allegations of psychologism traditionally moved against Peirce's early epistemology. Instead, they show that Peirce's theory of perception understands perception *logically* as a kind of inference.

Peirce's early engagement with psychology also provides an interesting terrain where his position can be compared to that of William James. James' main objection to Peirce's theory of perception would have been that it was philosophical rather than psychological: it did not inquire about the functioning of the mind from the perspective of experience, rather it went beyond experience to suppose logical structures at the basis of it. This objection was also moved against Wundt and Helmholtz for the same reasons, i.e. for upholding an inferential theory of perception. However, the main interest in a Peirce-James comparison here lies in underscoring the impact that Peirce's 1868 and 1877-8 essays had beyond pure philosophy, as well as the common interests that united

Peirce and James in spite of their very different aims. Nonetheless, James's attention for the phenomenic aspect of consciousness (i.e., for what it appears) will also influence Peirce, as I illustrate in Ch.s 5 and 6.

Another important contribution of this chapter to the current literature on Peirce's *Illustrations* is the notion of knowledge as a *collective enterprise* and its connection with the inferential theory of perception. If knowledge is a collective project, only from the perspective of a community of inquirers the adoption of the scientific method as a method for settling doubt can be preferred over irrational methods such as holding on to one's opinion and disregarding any evidence to the contrary (the method of tenacity). From an individual perspective, the method of tenacity would be perfectly fine, as Peirce himself recognized. Peirce's invocation of the "social impulse" as a way out from the method of tenacity is not a declaration of psychologism or of social relativism, rather the recognition that, from our sensory perceptions to our notion of "I," we depend on an incessant stream of inferences and testimonies. The "social principle" is thus hard-wired in the logical constitution of our perception of external objects and of the self.

Ultimately, the allegation of psychologism, in its basic definition of psychologism – i.e., the idea that logical laws are grounded on psychological facts – does not hold for the philosophy of the early Peirce. On the contrary, Peirce decidedly attributes a logical structure to physiological phenomena, assimilating the process behind the appearance of sensation to hypothesis making and the structure of attention to induction. However, Peirce also expands the notion of logic in ways that many logicians and contemporary philosophers may reject. Thus, the traditional question over psychologism in Peirce's early writings is partially inappropriate; what is more interesting is to uncover the unique way in which Peirce understood logic and psychology. In the next chapter, I dive deeper in the philosophical background of Peirce's inferentialism, looking at Kant, Helmholtz, and at Peirce's Berkeley review of 1871.

# Chapter 3. Building Perception.

## German experimental psychology and its philosophies

„Die Gesetzmässigkeit im menschlichen Geiste gleicht vollkommen der am  
Sternenhimmel.“  
Herbart 1816: 108 (§135).<sup>76</sup>

### Introduction

Philosophy informed psychology continuously in the course of the nineteenth century in at least two key aspects: in formulating the overarching questions of psychological research and in interrogating the criteria used to assess methods and practices of inquiry. For example, as Danziger (1980a) shows, the meaning of “intuition” changes significantly in the German and in the British *psychological* traditions, and this can be understood with reference to the different *philosophical* traditions. Moreover, the exercise of separating philosophy and psychology is a recent outcome of the institutional separation of the chairs of psychology and philosophy. The so-called “founder” of experimental psychology, Wilhelm Wundt, was strongly against it, and so was North America’s most famous psychologist, William James.<sup>77</sup>

In this chapter, my aim is to explore the contested nature of psychology between philosophy and science in the thought of German thinkers who all had an influence in Peirce. The particular angle from which I examine the intermingling of psychology and philosophy is functional to gaining a better understanding of Peirce’s theories of perception. Peirce retrospectively attributed his growing distance from the recognised canon of experimental psychology to his early study of Kant and to his chemistry degree,

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<sup>76</sup> “The lawfulness in the human soul perfectly equates the lawfulness of the starry sky.”  
Translation mine.

<sup>77</sup> See Kusch (1995: 193-6) and Bordogna (2008: 59-90). I illustrated Wundt’s position with more detail in Ch. 1.

which would have given him a different perspective from the start. Talking of himself in the third person, Peirce explained:

It seems strange that in a few years he should have found himself somewhat at variance with those scientists, and that the breach should only have been widened with time, notwithstanding a very warm esteem for their proper work, which has not in the least diminished. The principal cause of this no doubt was that when the first great work after the *Psychophysik* of Fechner (i.e. Wundt's *Vorlesungen über die Menschen und Thierseele*, 1863) appeared, he had already been an energetic student of philosophy for half a dozen years, and was especially imbued with Kant [...]. Yet he had not lost touch with the physical sciences in which he had been bred, having taken his degree *summa cum laude* in chemistry. If this was a less arduous preparation for the comprehension of the new psychology than others had made, which doubtless was the case, it perhaps laid a broader, and certainly different foundation from those that others had prepared. (Peirce 1903 p.q., MS 606: 23-4).

In this chapter, my aim is to uncover that part of Peirce's philosophical "foundation" to experimental psychology that possesses many and immediate consequences to the development of experimental psychology as a science.<sup>78</sup> Overall, there are four crucial aspects of the German tradition that would influence Peirce's psychology and his theory of perception: (1) envisaging reality as what resists us and as lawfulness; (2) the notion of degree in perception; (3) an inferential and symbolic account of perception; (4) the notion of threshold of perception. These points cannot be considered in isolation and they often overlap (as much as the authors who formulated them).

I am not claiming that these four aspects can be found exclusively in the German tradition; however, they constitute an important part of the German debate around perception and the possibility of psychology as a science, started by the popularity of Immanuel Kant (1724-1804). Germany became, in the nineteenth century, the leading country in experimental psychology. Thus, this chapter retraces some treads of Kantian

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<sup>78</sup> For an assessment of the influence of chemistry on Peirce's philosophy, see Campbell (2017).

and post-Kantian thought which are particularly significant for Peirce's theory of perception.

Highlighting these aspects of the German tradition is also functional to a new appraisal of pragmatism's relation with it. The community of Peirce scholars is divided between those who trace Peirce's pragmatism back to Kant's notion of purposefulness<sup>79</sup> (Gava 2014, 2008), those who describe it as a complete breach from the Kantian tradition (Maddalena 2019) and those who claim that its origins lie in the British empiricist tradition (Wilson 2016).<sup>80</sup> By focusing on psychology and on Peirce's theory of perception, I access these traditions from an unconventional angle and can therefore highlight connections which have so far remained unexplored.

The chapter is articulated as follows: firstly (3.1) I present Kant's argument for excluding psychology from the natural sciences and his introduction of the notions of degree, reality and continuity in perception. These notions would be the basis for any subsequent attempt to transform psychology into an experimental science. Next (3.2), I illustrate Johann Friedrich Herbart (1776-1841) and Gustav Theodor Fechner (1801-1887)'s positions on the threshold of perception. Herbart built a scientific psychology according to Kant's criteria, i.e. a priori and mathematically constructible; Fechner (1801-1887) made the threshold of perception a cornerstone of experimental psychology. In Section 3.3, I explore a different account of constructability, the empiricist inferentialism of Hermann von Helmholtz (1821-1894). I illustrate his physiological psychology and Peirce's reception of Helmholtz. Ultimately, Helmholtz's inferentialism supports Peirce's

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<sup>79</sup> Gabriele Gava defines purposefulness as "an orientation toward an end involved in a thought process" (Gava 2008: 699). For a different interpretation of Peirce's uses of Kant see Karl-Otto Apel (1995; 1981).

<sup>80</sup> Aaron Bruce Wilson (2016) proposes that the whole of Peirce's philosophy of perception can be reconducted to the empiricist tradition. Without being constructed as an argument against Wilson, the material of this chapter and especially of Ch.s 1 and 2 challenges Wilson's statement that "Peirce's thoughts on perception seem not to have blossomed until around the turn of the century," with the MS *Telepathy* (1903) "providing most of the details of his theory" (Wilson 2016, 118). In fact, it is impossible to make sense of *Telepathy* if one does not take into account the psychological theories that Peirce had absorbed and put into practice *before* 1903. See my Ch. 5 for an account of how Peirce engaged with the telepathic debate and Ch. 6 for an analysis of the MS *Telepathy* from a history and philosophy of science perspective.

general views on scientific method and explains his growing distance from the psychology of William James.

### 3.1 Kant, the improper science, and the notion of degree

Psychology was not a natural science [*Wissenschaft*] in Kant's times.<sup>81</sup> In the *Metaphysische Anfangsgründe der Naturwissenschaft* ([1786] AA 4: 471, Eng tr. *Metaphysical Foundations of Natural Science*, 2004: 7),<sup>82</sup> Kant denied the possibility that psychology may ever produce scientific knowledge, granting it at best a "historical" kind of knowledge. This and related claims on the limits of psychology are object of detailed discussions within Kant's scholarship.<sup>83</sup> In fact, even if Kant rejected the possibility that psychology could ever become a science, his standards for science as well as his analysis of perception<sup>84</sup> were very influential on the post-Kantian development of scientific psychology. In the following, I briefly illustrate Kant's notion of the object of psychology and his arguments against the possibility of psychology as a science.

Unfortunately, Kant's use of the word "psychology" is not unambiguous and thus his arguments against the possibility of psychology as a science have different targets (Sturm 2001: 163). "Psychology" can be taken to refer to a science of the soul, understood as a metaphysical substance or as a transcendental activity; or as the science of the empirical stream of impressions in the inner sense. For Kant, while the first two are impossible objects, the third one does not warrant the construction of any scientific

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<sup>81</sup> The English term "science" was invented in the nineteenth century by William Whewell. The German term for science is *Wissenschaft*, which denotes a certain kind of knowledge but has no immediate connection with experimentation.

<sup>82</sup> The works of Kant quoted in this chapter are the *Critique of Pure Reason* (1781/1777), quoted from the translation of Norman Kemp Smith (1933) according to the classic reference to the pages of the two editions (A#, B#); and the *Metaphysische Anfangsgründe der Naturwissenschaft* (1786), quoted from the translation of Michael Friedman (2004) and with added reference to the *Akademieausgabe* (AA) of Kant's *Gesammelten Werken* (<https://korpora.zim.uni-duisburg-essen.de/Kant/verzeichnisse-gesamt.html>).

<sup>83</sup> See for example Paul Guyer (1987), Nayak and Sotnak (1995), Thomas Sturm (2009), Katherina Kraus (2013, 2018).

<sup>84</sup> In the *Anticipations of Perception*, A166/B208ff.



knowledge. In the following, I take care of disambiguating the meaning of psychology in the *Critique of Pure Reason* before addressing Kant's position in the *Metaphysical Foundations of Natural Science* (1786/2004).<sup>85</sup>

The “science of the soul” which is the target of Kant's criticism in the chapter on the Paralogisms of Pure Reason (A342, B399ff.) was best represented, at the time, by Christian Wolff's (1679-1754) rational psychology: a metaphysical theory of the soul, its essential attributes and properties. Indeed, psychology occupied a prominent place in Wolff's system of philosophy and had benefited from particular attention in seventeenth century Germany. At that time, France and England did not have comparable notions for psychology or *Seelenlehre* [doctrine of the soul], and when, in the eighteenth century, the term “psychology” made it into their dictionaries, it was elucidated with a short exposition of Wolff's doctrine (Bell 2005: 12-15). The problem that Kant identified with Wolff's rational psychology is that it goes from the recognition of an activity (i.e., thought, as exercised by the faculties of the mind) to the hypothesis of a substance underlying such activity (i.e., the soul). Kant denied the legitimacy of this move, since its very object (the soul) appeared to his analysis as the result of an illicit syllogism (i.e., a paralogism).

Distinct from the metaphysical notion of soul as a unique, indivisible, permanent substance is the notion of soul as an *ideal* of pure reason. An “ideal of pure reason” is an object towards which pure reason strives, although it can never become an object of possible experience (A670-72, B698-700). Recently, Katherina Kraus (2018) elaborated on the connection between the soul understood as an ideal of pure reason and the transcendental notion of “I-think” in an effort to ground psychology as a science within Kant's philosophy. Striving to find an integration between the transcendental and the empirical elements of Kant's psychology, Kraus identifies reason's idea of soul as the

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<sup>85</sup> The opportunity of reading the MFNS alongside the first *Critique* received different assessments in the long tradition of Kant's scholarship. The terms of the contemporary discussion of the issue are essentially defined by Gerd Buchdahl (1969), who influentially argued for a “looseness of fit” between the two works, and Michael Friedman (1992), who gave a most substantial push to the reappraisal of the connections between the two works (Friedman 2004, xxxiii). The recent special issue of *Studies in History and Philosophy of Science* edited by Michela Massimi (2013) follows Friedman's lines in paying attention “to how Kant's philosophy of natural science complements his theoretical philosophy, and the way in which it draws on the sciences of his time” (Massimi 2013: 393).

“guiding principle” of psychology. It is important to stress that the notion of “soul” employed by Kant (and by Kraus) as a regulative principle of psychological knowledge is *not* the traditional metaphysical notion of soul as substance. The soul as a regulative principle is also a guiding idea of inquiry, since thanks to it “empirical knowledge is more adequately secured within its own limits and more effectively improved than would be possible, in the absence of such ideas, through the employment merely of the principles of the understanding” (A671, B699).

The idea of soul is always applied to “the actions and receptivity of our mind, *as if* the mind were a simple substance which persists with personal identity...” (A672, B700; emphasis of the text). However, this epistemic use of the idea of soul is not to be confused with a working hypothesis, since a hypothesis designs objects that, although “invented, are thereupon assumed to be possible” (A771, B799). In contrast, regulative ideas “are thought only problematically, in order that upon them (as heuristic fictions), we may base regulative principles of the systematic employment of the understanding in the field of experience” (A771, B799). Useful as the transcendental idea of soul may be in organising our psychological experience, it is not an object of our knowledge nor a hypothesis which may be proved or disproved by further investigation. It cannot, therefore, be the object of a science of psychology.

In sum, neither the soul as a metaphysical object nor the transcendental notion of I-think would be good starting points for a scientific psychology. The first (the soul) is an illicit inference from the recognition of some activity to the postulation of a subject performing them; the second (the I-think) is a transcendental function, not an object of experience itself. Of the I-think there can be no knowledge other than the fact that, in Kant’s system, it is the condition of possibility of unified conscious experience.

There is, however, a third object that the term “psychology” could designate: the study of the “inner sense,” i.e. of the succession of the empirical, experiential contents of consciousness in time. An important objection to making of the inner sense alone the object of Kant’s scientific psychology is the requirement of systematicity that scientific knowledge has for Kant (Kraus 2018: 83). Indeed, Kraus’s (2018) argument for the integration of transcendental and empirical psychology in a unified science is also based on the recognition of the systematicity requirement. It is thus the moment to turn to elucidating Kant’s notion of what scientific knowledge consists in.

At the very beginning of the *Metaphysical Foundations*, Kant defines science “every doctrine that is supposed to be a *system*, that is, a *whole* of cognition ordered according to principles” (AA 4: 467; 2004: 3; emphasis added). Scientific knowledge is systematic knowledge, which can be *rational* or *empirical* according to whether its principles are rational or empirical (AA 4: 468; 2004: 3). Kant insists that “nature” is “the first inner principle of all that belongs to the existence of a thing” (AA 4: 467; 2004: 3), and that a proper natural science is built on “a *derivation* of the manifold belonging to the existence of things *from their inner principle*” (AA 4: 468; 2004: 4; emphasis added). Only when such derivation is possible a priori the science is “proper,” otherwise – when “laws of experience” mediate between the forms of intuition and our objects – the discipline is a science only “improperly so-called” (AA 4: 467; 2004: 4).

Systematicity is an essential requirement of a “science properly so-called” because only a systematic body of knowledge constitutes “a whole.” However, true systematicity cannot be obtained by reorganising material empirically gathered, because empirical knowledge is always provisional. Thus, only if the core structure of our system can be shown to derive from the “inner principle” organising our object of study our knowledge can be said scientific in a proper sense.

Kant’s requirement for scientific properness in the *Metaphysical Foundations* is so strict that it excludes not only psychology, but also chemistry from the possibility of ever becoming sciences. However, it is worth stressing that this exclusion only concerns the possibility of deriving chemistry or psychology from “inner principles.” It does not deny the possibility of chemical or psychological knowledge, nor does it amount to a denial of their growth (in terms of amount of knowledge). But what are these inner principles to which the possibility of something being a science is attached? If one thinks about the physical sciences, the inner principle out of which they are constructed in Kant’s system is the notion of space: their objects are all objects imagined in space. For Kant, space is one of the two forms of intuition, i.e. one of the two necessary conditions of our perception of external objects. The other form of intuition is time; time is therefore the inner principle from which a scientific knowledge of psychology should be derived. However, as Kant stated in the famous passage of the *Metaphysical Foundations* where he denied to empirical psychology the possibility to reach the status of science, this is not as straightforward as it may seem:

Yet the empirical doctrine of the soul must remain even further from the rank of a properly so-called natural science than chemistry. In the first place, because mathematics is not applicable to the phenomena of inner sense and their laws, the only option one would have would be to take the law of continuity in the flux of inner changes into account – which, however, would be an extension of cognition standing to that which mathematics provides for the doctrine of the body approximately as the doctrine of the properties of the straight line stands to the whole of geometry. For the pure intuition in which the appearances of the soul are supposed to be constructed is time, which has only one dimension. (AA 4: 471, Eng tr. 2004: 7).

According to Kant's argument, mathematics is not applicable to psychology because the material afforded by psychological observation is too limited to display mathematics' powers: for one, the inner sense is only articulated in the one-dimensionality of a "flux of inner changes," so that the mathematics that could be used would be limited to the law of continuity of the succession of representations in time. Indeed, it would be like trying to reduce the whole geometrical power of construction to the only element of a line. Thus, the kind of knowledge that psychology affords would be anything but "properly so-called natural science." It is important to note that for Kant this did not mean to deny the value of psychological knowledge; in fact, by allowing it to be something different than mathematical (i.e. geometrical) demonstration, Kant allowed psychology to be at home in anthropology, and thus to be closer to the whole of lived experience. In fact, Kant argued also that psychology could not be an *experimental* science:

... the empirical doctrine of the soul can also never approach chemistry even as a systematic art of analysis or experimental doctrine, for in it the manifold of inner observation can be separated only by mere division of thought, and cannot then be held separate and recombined at will (but still less does another thinking subject suffer himself to be experimented upon to suit our purpose), and even observation by itself already changes and displaces the state of the observed object. Therefore, the empirical doctrine of the soul can never become anything more than an historical doctrine of nature, and as such, a

natural doctrine of inner sense which is as systematic as possible, that is, a natural description of the soul, but never a science of the soul, nor even, indeed, an experimental psychological doctrine. (AA 4: 471, Eng tr. 2004: 7).

Psychology cannot be an experimental science because psychology's object cannot be manipulated at will: one cannot observe someone else's mental processes, nor one's own mental processes as they are happening without altering them by the sheer process of observation. Psychological observations cannot be repeated, modified, and placed back into the "flux" of consciousness. As William James would describe it, "The attempt at introspective analysis in these cases is in fact like seizing a spinning top to catch its motion, or trying to turn up the gas quickly enough to see how the darkness looks" (James 1884: 3; W1: 988). To this impossibility claim, Peirce interestingly replied that such analysis is done all the time by mathematics and does not require any introspection: "To cut a thought across and look at the section requires no introspection. It is one of the principal methods in mathematics, which is in no degree introspective" (CP 8.90).<sup>86</sup> If Peirce's externalist method allowed experimentation, it could only do so by taking away the introspective approach to the "soul" which seemed so natural to Kant and James.<sup>87</sup>

Kant however did introduce something that would allow the analysis and the a priori construction of the inner sense: the notion of degree. For the inner sense, the degree represents the only way to access a priori constructability, which is in *Metaphysical Foundations* the main requirement for obtaining the status of natural science.<sup>88</sup> In the *Critique of Pure Reason*, the notion of degree is introduced in the "Analogies of

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<sup>86</sup> This is the 42th Question of a series of 45 Questions to v.1 of James' *Principles of Psychology* (1890). As Girel (2003: 195, n. 65) writes, "Questions 33, 36, 41-42 were published as 8.72-90. KB. Perry, in Perry (1935), quotes this manuscript in part. It is generally dated c.1891, but there is evidence that it was written a little later: André de Tienne told me in recent correspondence that its publication was not scheduled before Volume 11 of the Writings. Questions 41-42 in particular fit well with the correspondence between WJ and CSP in 1894."

<sup>87</sup> Bellucci (2015: 75) already recognises that Kant's "doctrine of mathematical construction" was "transformed [by Peirce] into his theory of diagrammatic reasoning." Of course, for Peirce such analysis is in fact logical, not psychological.

<sup>88</sup> The notion of degree plays an important role in Kant's metaphysical construction of the laws of motion (i.e., "Phoronomy") in the *Metaphysical Foundations*.

Experience,” the third chapter in the “System of the Principles of Pure Understanding.” The notion of degree (together with the a priori forms of space and time) *justifies* the application of mathematics for the *construction* of phenomena of sensation:

The two previous principles [i.e., Axioms of Intuition and Anticipations of Perception], which, as *justifying the application of mathematics to appearances*, I entitled the mathematical, referred to the possibility of appearances, and taught how, alike as regards their intuition and the real in their perception, they can be generated according to rules of mathematical synthesis. Both principles justify us in employing numerical magnitudes, and *so enable us to determine appearances as magnitude*. For instance, *I can determine a priori, that is, can construct, the degree of sensations of sunlight by combining some 200,000 illuminations of the moon*. These first principles may therefore be called constructive. (A178-9, B221; emphasis added).

The notion of degree, on the one hand, is enabling an a priori, i.e. constructive approach to sensations; on the other hand, the notion of degree in perception has a connection with envisaging reality as what resists us and as lawfulness: “rules of mathematical synthesis” enable us to anticipate a priori the degree that a certain sensation will have. The connection between the notion of reality in sensation, its independence from what we may wish for it, and the possibility offered by the notion of degree to actually capture this “reality,” ambiguous as it may be, is of great importance for the development of successive theories of psychology and perception.

As Kraus (2013: 340) notes, “the debate about the distinction between sensation and the real that ‘corresponds’ to sensation is closely related to discussions about Kant’s ambiguous use of the term ‘sensation’.” This ambiguity was noticed already by Hermann Cohen (1842-1918), in his “little, revolutionary book” (Beiser 2014: 465) *Kants Theorie der Erfahrung* [1871; “Kant’s Theory of Experience”] and further articulated by Anneliese Maier (1905-1971). Maier distinguished between the content and the process of sensation, concluding that “what can be subsumed under the category of reality can only be the content of sensation” (Maier 1930: 56; quoted in Kraus 2013: 340). Kraus herself identifies the real in sensation with “the ‘material’ content of representation, [...] *an empirical reality that cannot be changed at will*” (2013: 341-2; emphasis added).

Undoubtedly, this rings a bell for the Peirce scholar, accustomed to think reality as “that which resists us” and is “independent of the vagaries of you and me” (W3: 254).<sup>89</sup>

Kant’s example (the equivalence between the sensation of sunlight as 200,000 times moonlight) comes from the scientific work in photometry (the measurement of the brightness of stars) conducted by Johann Heinrich Lambert (1728-1777). Again, the connection between the discipline of astronomy and Kant’s philosophical analysis of perception is not casual: as I detail in Ch. 4, there are historical and methodological links between the development of precision astronomy in the nineteenth century and the development of experimental psychology.<sup>90</sup> Peirce himself, whose university degree was in chemistry but who worked for the Harvard observatory and for the US Coast and Geodetic Survey, was a practicing astronomer who employed psychological laws in astronomy and who brought the talent of an experimental scientist to psychology.

There is a last aspect in which the anticipation of sensation in the degree and its reality come together in Kant. Kant analysed the notion of degree in detail in the section just preceding the *Analogies*, namely the “Anticipations of perception:”

Every sensation, therefore, and likewise every reality in the [field of] appearance, however small it may be, has a degree, that is, an intensive magnitude which can always be diminished. Between reality and negation there is a continuity of possible realities and of possible smaller perceptions. Every colour, as for instance red, has a degree which, however small it may be, is never the smallest... (A169/B211; emphasis added).

Thus, if the degree belongs to the continuum of sensation, as the interplay between quantitative and qualitative elements suggests, then the reality of the phenomenon, experienced quantitatively as a degree, could be diminished indefinitely: there would never be a point in which phenomenal reality could be constructed as an empty space-time container, because any anticipation of perception in intuition would involve some degree of sensation, however faint. The absence of sensation would be equivalent to an absence of “reality”:

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<sup>89</sup> This notion of reality as what resists us in perception will come back in Peirce’s mature theory of perception, that I examine in Ch. 6.

<sup>90</sup> Peirce himself will have the occasion to apply psychophysics to astronomical observations precisely in his photometrical researches for the Harvard observatory (Peirce 1877; see Ch. 4).

The absence of sensation at an instant would involve the representation of the instant as empty, therefore as = 0. Now what corresponds in empirical intuition to sensation is reality (realitas phaenomenon); what corresponds to its absence is negation = 0. (A167/B209).

This passage did not remain unnoticed among post-Kantian philosophers and scientists. A very influential case is that of Schelling, who, as pointed out by Giovanelli (2011: 83-4), incorporates the very details of Kant's formulation of the principle of the "Anticipations of Perception" in his 1797 essay *Ideas for a Philosophy of Nature* [Ideen zu einer Philosophie der Natur]:

[R]eality [Realität] is only felt [gefühl], is only present in sensation. Yet what is felt [empfunden] is called quality. [...] the real in sensation must be able to increase, or diminish, indefinitely; it must, that is, have a specific degree, though one that can equally well be thought of as infinitely greater, or as infinitely smaller; or, to put it otherwise, between which and the negation of all degree (= 0) an infinite sequence of intermediate grades can be imagined. (HKA 1:5:249. Eng. tr. by Harris and Lauchlan 1988).

Schelling is restating – almost literally – Kant's position; however, Schelling's perspective is no longer the critical one. In fact, the discourse has changed from the *conditions of possibility* of our knowledge of the real in perception to metaphysical claims about reality as such. The degree of Schelling's text belongs to nature; that of Kant's belongs to the perceiving faculty, and it is the only element of perception that it is possible to anticipate *a priori*.

Schelling's relevance in the economy of my narrative rests in his influence. Via different authors, among which the most important is perhaps the naturalist and philosopher Lorenz Oken (1779-1851), this notion of the real as connected with the *degree* in sensation and as fundamentally *continuous* came to Gustav Theodor Fechner (1801-1887), whom I discuss in the next section.

Another important influence on Fechner was Herbart, who developed a philosophical psychology around the possibility to treat psychical phenomena mathematically. Herbart's psychology is entirely *a priori*, in complete adherence to Kant's idea that a proper science should be able to a priori construct its object. In fact, as Bellucci



(2015: 72) notes, “Herbart might be considered to be the father of nineteenth-century anti-psychologism.”<sup>91</sup>

While Herbart’s psychology only arrived in the U.S. in the 1890s, with Peirce’s writing positively about Herbart’s theory of association in 1897 (Bellucci 2015: 79), Herbart had a more immediate impact on his German colleagues. In particular, Herbart introduced into psychology the idea of “threshold” of consciousness, with interactions between psychical elements happening both below and above threshold. Only the ones occurring above the threshold would appear to our conscious life. Heidelberger notes that Fechner’s concept of threshold, which will be challenged by Peirce and Jastrow in 1884 (see Ch. 4), “stems from Herbart, with whom it appears for the first time in 1816” (Heidelberger 2010: 223). In the next section, I illustrate Herbart and Fechner’s notions of threshold before moving to Helmholtz’s *empirical* inferentialism and its influence on Peirce.

### 3.2 Herbart and Fechner: mathematical and experimental psychology

Herbart’s project of a mathematical psychology was a case of attempting to develop psychology as a science of the inner sense according to Kant’s principles of a “science properly so-called.” Thus, psychology would proceed from the basic elements of mental activity, i.e., for Herbart, representations (*Vorstellungen*), to mathematically construe a knowledge of the whole mental activity. Specifically, Herbart aimed to find the laws regulating the aggregation (*Verschmelzung*) and inhibition (*Hemmung*) of representations, having as their outcome the flow of representations constituting our conscious life.

Herbart’s psychology proposes “a model of the mind in which mathematics occupied the same place as in Sir Isaac Newton’s (1642-1727) description of the solar system” (Boudewijnse, Murray, and Bandomir 1999: 163). This is indeed the meaning of the sentence quoted in the opening of this chapter: “The lawfulness in the human soul perfectly equates the lawfulness of the starry sky.” Mirroring physics but also

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<sup>91</sup> Bellucci is following Werner Stelzner (2003: 83) and Rolf George (2003: 36).

incorporating the Leibniz-Wolff tradition<sup>92</sup> in his Newtonian model, Herbart conceived representations, in so far as they are put against each other [widerstehen], not as things but as forces [Kräfte] (Herbart 1816: 101; §124).<sup>93</sup>

Mental representations in relation with each other can thus be considered as forces, able to act upon each other and to inhibit or reinforce each other. Already in his 1816 *Lehrbuch zur Psychologie*, Herbart introduced the notion of threshold of consciousness [Schwelle des Bewusstseyn] – further articulated into the static and the mechanic threshold, to be explained below – to model the interaction of representations.<sup>94</sup> In his 1816 *Lehrbuch zur Psychologie*, Herbart wrote:

Here the expression “threshold of consciousness” must be explained, since we will need it sometimes. A representation is in consciousness in so far as it is not an inhibited, rather an effective [Wirklich] representation. When it elevates itself only so little from a state of complete inhibition, the representation dawns into consciousness. Here, the representation is on the threshold of consciousness. It is very important to establish by calculation how strong a representation should be in order to linger just on the threshold of consciousness between two or more stronger representations. In that point, the smallest retreat of the obstacle [i.e., of the other representations] would

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<sup>92</sup> See Leary (1980: 162), endnote 45: “Wolff maintained Leibniz's doctrine that activity, force, or intensity is a basic characteristic in both the material and mental realms.” Leary also notes that Wolff “generally spoke of this active power (*Potestas* or *Vis*) as a characteristic of the mind as a whole, or its faculties, not of individual ideas. This is in contrast with Herbart’s psychology, where individual representations can be treated as forces when they are examined in their relation to each other. However, Wolff stated explicitly that “all qualities are measurable since qualities have degrees” (*Philosophia Prima sive Ontologia* [1730], in *Werke*, Part 2, vol. 3: 561). The notion of degree was a crucial notion for Wolff’s projected “psychometry” and was later incorporated in Herbart’s psychology too. See also Wolff’s *Philosophia Prima*. pp. 432-441; 561-567; *Psychologia Rationalis*, pp. 76-78.

<sup>93</sup> Herbart 1816: 101, §124: “Vorstellungen warden Kräfte, indem sie einander widerstehen. Dieses geschieht, wenn ihrer mehrere entgegengesetzte zusammentreffen. [...] An sich selbst aber sind die Vorstellungen nicht Kräfte.”

<sup>94</sup> See Herbart 1816, §130; 1825: 175).

immediately turn the [hereto inhibited] representation into a real, effective representation. (Herbart 1816: 105, §130).<sup>95</sup>

The concept of threshold expresses the point where the strength of inhibition equals the strength of the representation; at this point, any decrease in the inhibition is a partial removal of the “obstacle” that prevents the representation in question to manifest itself in consciousness, i.e. to become *real* for the consciousness. This is what Herbart calls the “static point” (*der statische Punct*) of a representation (1816: 103-4; §128). The static point can be compared to the waterline of a representation floating on consciousness. If inhibition is increased, the representation sinks below consciousness, moves away and becomes “obscured” [verdunkelt]. Instead, when the threshold is examined from a mechanical standpoint, what is taken into consideration is the conflict between representations and their reciprocal inhibition which makes them tend to a situation of equilibrium.

Of notice is here how the traditional distinction in “clear” and “obscure” representations, which had been defined by Descartes and Leibniz with properties of the representation itself, is understood by Herbart in terms of the *movement* of a representation towards consciousness or away from it.<sup>96</sup> The representation is not annihilated by inhibition, rather it is transformed from “real” representation to a *struggle for being represented* in consciousness,<sup>97</sup> which ensures the *repetition* of representations

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<sup>95</sup> Herbart 1816: 105; §130: „Hier muss der Ausdruck : Schwelle des Bewusstseyns, erklärt werden, dessen wir manchmal bedürfen werden. Eine Vorstellung ist im Bewusstseyn, in wiefern sie nicht gehemmt, sondern ein wirkliches Vorstellen ist. Sie tritt ins Bewusstseyn, wenn sie aus einem Zustande völliger Hemmung so eben sich erhebt. Hier also ist sie an der Schwelle des Bewusstseyns. Es ist sehr wichtig, durch Rechnung zu bestimmen, wie stark eine Vorstellung seyn müsse, um neben zweyen oder mehreren stärkeren noch gerade auf der Schwelle des Bewusstseyns stehn zu können, so dass sich beym geringsten Nachgeben des Hindernisses sogleich anfangen würde, in ein wirkliches Vorstellen überzugehn.“

<sup>96</sup> Herbart 1816, ...; §127: „die fortgehende Veränderung ihres [der Vorstellung] Grades von Verdunkelung nenne man ihre Bewegung.“

<sup>97</sup> Herbart 1816: 102; §125: „Das *Vorstellen* also muß nachgeben, ohne vernichtet zu werden. Das heißt, *das wirkliche Vorstellen verwandelt sich in ein Streben vorzustellen*.“ Emphasis of the text. [“*Representation* must then give in, without being annihilated. This means, *that the effective act of representing changes into the tension of representation*.”]

in consciousness once the obstacles preventing their manifestation are in their turn pushed away and obscured by other representations.

Both the “darkness” and the “brightness” of a representation are expressed in degrees. Thus, the intensity of a representation and its possible effect can be constructed mathematically with an application of the relevant laws. In Herbart, who follows Kant’s notion of science closely, mathematical construction does not mean *measurement*. Herbart’s model of the movement of representations in and out of consciousness is built on intuitive descriptions of what constitutes a representation and what constitutes the unity of consciousness.<sup>98</sup>

It is Fechner who brought Herbart’s mathematical insight and the notions of degree and of threshold into the domain of measurement. In 1860, Fechner published his *Elemente der Psychophysik* [Elements of Psychophysics], the founding text of psychophysics; in it, psychology becomes not just a mathematical, but an experimental science. Fechner believed in the possibility of mathematical psychology opened up by Herbart; however, he did not think that dealing exclusively with mental phenomena, i.e. “representations,” as Herbart did, was enough. Based on the hypothesis that physical and psychical phenomena are in fact two sides of the same phenomenon – a notion which Heidelberger (2005) names “functional parallelism,” – Fechner framed his project for a scientific study of the soul as an alternative to Herbart’s purely mathematical psychology.

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<sup>98</sup> Herbart 1816: 102, §125: „Was geschieht nun durch den angegebenen Widersland? Vernichten sich die Vorstellungen ganz oder theilweise? Oder bleiben sie unverändert, trotz dem Widerstande? Da wir hier in diesem Buche auf speeulative Gründe nicht eingehn können, *so bestimme man den Sinn der Hypothese nach der Erfahrung*. Diese zeigt sogleich, daß keins von beyden Statt finden darf, in wiefern die Hypothese etwas erklären soll. Vernichtete Vorstellungen sind so gut als gar keine. Blieben aber die Vorstellungen, trotz der gegenseitigen Anfechtung, ganz unverändert, so konnte nicht, *wie wir jeden Augenblick in uns wahrnehmen*, eine von der andern verdrängt werden.“ Emphasis added. [“What happens then through the given contradiction? Do representations annihilate each other totally or in part? Or do they stay unchanged, regardless of the contradiction? Since in this book we cannot argue from speculative principles, *we determine the sense of the hypothesis from experience*. Experience thus shows, that none of the two [cases] can happen, or the hypothesis will not explain anything. Annihilated representations are just as good as none. But if the representations remained completely unchanged in spite of the opposite force, then they could not replace one another, *as we perceive in us at every moment.*”]

Fechner had distanced himself from Herbart's purely mathematical psychology already in 1851, in a book whose religious inspiration is apparent from the title: *Zend-Avesta*, "living word" in ancient Persian, was a reference to Zoroastrianism's sacred text (Beiser 2020). While Frederik Beiser finds that "Fechner's philosophy is characterized by a clash between his metaphysical interests and his positivist proclivities," Fechner surely was inspired in envisaging his "functional parallelism" by the metaphysical parallelism that he saw between body and soul.<sup>99</sup> At a metaphysical level, Fechner's system is a kind of pan-psychism; epistemologically however, Fechner's model was designed to meet Herbart (and Kant's) emphasis on constructability and (mathematical) derivability as criteria of scientific knowledge.

As it was typical of Fechner, he did not let his metaphysical preferences play any explicit role in criticising Herbart's one-sided approach to psychology.<sup>100</sup> Fechner's argument was rather that scientific psychology had to be linked to some phenomena which are measurable, and inner representations are not directly measurable:<sup>101</sup>

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<sup>99</sup> Fechner 1851, v.2: 313-4: „Um mit einem Bilde zu beginnen, so ist das Leibliche oder Körperliche gleich einer Schrift, das Geistige, Psychische (Höheres und Niederes zunächst noch in Eins gefaßt) wie der zugehörige Sinn der Schrift, in solcher Weise aber, daß die, als lebendige zu fassende Schrift sich selbst nur unter der Form ihres Sinnes, Andern nur unter der Form der äußeren Zeichen erscheinen kann.“ [To start with an image: What pertains to the bodily or material [aspect of nature] is like a text, while what pertains to the spiritual or psychical [...] is like the meaning attached to the text. In this way the text, which must be understood as living text, appears however to itself only as its own meaning, and to others only as external signs.]

<sup>100</sup> Interpreters are however still eager to defend the autonomy of Fechner's science from his metaphysics. Thus Heidelberger (2010: 204) writes: "...Fechner's work does in fact contain a rational core which is scientifically tenable, and which can be justified independently of the wilder, more speculative strands of his metaphysics. As will become clear, when it came to the foundations of its science (i.e., that of psychophysics), Fechner was even more critical of metaphysics than were his contemporaries." And: "...just as [...] alchemico-theological speculation does not speak against [the] fruitful development [of Newton's concept of force] in mechanics, [...] so too is Fechner's panpsychism neither an argument against the scientific status of psychophysics [...] nor against his concept of the unconscious." See also Heidelberger ([1993] 2004).

<sup>101</sup> Although this affirmation is part of Fechner's history of psychophysics, not everyone would agree on it. Thus Ernst Mach (1838-1916) in his "Vorträge über Psychophysik" [Lectures on

I believe that Herbart's principle of mathematical psychology is not convincing. If mathematical psychology is feasible at all (which I believe to be the case), then in my opinion we shall have to take as a basis for computation the physical phenomena to which mental phenomena are connected because they provide an immediate starting point for computation and a well-defined measure. This is not the case for mental phenomena, though there is basically nothing to prevent us from considering the physical phenomena underlying mental phenomena as a function of the latter, as well as vice versa. (Fechner 1851/1987: 203. Emphasis added).

Fechner was aware that, to maintain that physical stimuli afford an indirect but accurate measure of psychical phenomena, he had to find a constructive and testable way to picture that relation. If mathematics provides the language in which psycho-physical hypotheses are expressed, it is experiment that assesses psycho-physical claims:

...we have to spell out, on the basis of our approach, a definite, mathematical dependency relation between the two [mental and physical domains], which - despite the absence of a direct, accurate measure of phenomena in the mental realm - is open to empirical confirmation [...]. ... we have to extend the computation, which is based on the principle of this dependency, to the quality of mental phenomena, just as computational physics has been extended to the quality of colors and sounds, and to do this in a way that is coherent with the latter... (Fechner 1851/1987: 203).

A chief obstacle in the measurement of mental phenomena is that, it seems, if we can always order them along a scale, we cannot measure them by comparing them to a fixed standard. However, if each psychical phenomenon admits of a parallel physical one, then at least an indirect measure of psychical phenomena can be gathered via a measurement of their physical parallel. In this measurement, the notion of threshold of

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Psychophysic] (1863) defended Herbart's approach, arguing that even in mechanics terms were "interdefined by one another and not by comparing every isolated quantity with experience. All that was required for a scientific treatment, Mach said, was that 'inward states be of different intensities' (1863: 168ff)" (Banks 2003: 50). As Banks showed with help from Fechner's correspondence, "in Fechner's eyes Mach remained a convinced Herbartian" (Banks 2003, 47; Fechner to Mach, April 18, 1864).

consciousness, defined purely mathematically by Herbart in 1816, gains a new experimental value.

Fechner noticed already in 1851 that the progression in the intensity of physical stimuli was not matched point-by-point in the conscious psychological domain. Instead, physical stimuli had to be augmented of a certain quantity in order for the difference in intensity to be perceived in the psychological domain. Thus, in the domain of the *external* psycho-physical parallelism, “threshold” designates the minimal difference in intensity between two stimuli which still allows them to be paralleled by two distinct psychological phenomena.

There are two consequences from Fechner’s notion of threshold and from his functional understanding of the relation between the physical and the psychological that will be objected to by Peirce and Jastrow in their 1885 paper “On Small Differences of Sensation.” The first is that what happens below threshold must have a counterpart in the psychological domain (because of the “parallelism” between the two); thus, “negative sensations” would correspond to stimuli below threshold.<sup>102</sup> Peirce and Jastrow’s response would be to eliminate the need for a threshold and to turn Fechner’s negative sensations into infinitesimal sensations.<sup>103</sup>

The second consequence of Fechner’s assumptions concerns the *way* in which stimuli and sensations are related. For Fechner, the physical and the psychological world are basically the same world seen from two different perspectives: there is no need to introduce a process that would link physical stimuli to psychological sensations. For Peirce instead, the latter are a *result* of processes of unconscious inferences. Peirce’s models were Wundt’s notion of *unconscious inference* (as seen in Ch. 1), Helmholtz’s

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<sup>102</sup> Although of no consequence for Peirce, Fechner believed that “the most important meaning of the notion of psychophysical threshold is in providing a firm basis for the concept of unconscious in general. Psychology cannot abstract from unconscious sensations and from representations” (Fechner 1860, II, 438: „Über das Alles hat der Begriff der psychophysischen Schwelle die wichtigste Bedeutung schon dadurch, dass er für den Begriff des Unbewusstseins überhaupt ein festes Fundament giebt. Die Psychologie kann von unbewussten Empfindungen, Vorstellungen nicht abstrahiren.“ Trans. in Heidelberg 2010: 222). Fechner’s concept of the unconscious was instead inspirational for Freud (Ellenberger 1956).

<sup>103</sup> I return to this important point in Ch. 4.

inferentialist theory of perception, and Herbart's associationist psychology (Bellucci 2015: 79).

Fechner took issue directly with the question of unconscious inferences in another Appendix, this time to the second volume of his 1860 *Elemente der Psychophysik*, titled "Appendix about some new ground-breaking research in Psychophysics by Helmholtz."<sup>104</sup> The work referred to is the second volume of Helmholtz's *Handbuch der Physiologischen Optik* [Treatise on Physiological Optic], which appeared just in 1860.<sup>105</sup> Indeed, Fechner declares that he received Helmholtz's book as his was under press, and only managed to add a short comment to a work that he saw as largely corroborating his own.

Although Helmholtz's full-blown inferentialism is contained in the third book of his *Optik*, which will only appear in 1867, already in the second book Helmholtz introduced unconscious inferences to explain the phenomenon of contrast, i.e. when the perceived intensity of two colours is enhanced by their being next to each other. For Fechner, the question is "whether the increase of the impression through contrast is due to an *act of judgment* or to a *modification of the sensibility*" (Fechner 1860: 568; emphasis added).<sup>106</sup> Although Fechner's answer was that it is a modification of the sensibility what causes the impression of enhanced intensity in contrast, Fechner did not rule out unconscious inferences entirely.

According to Helmholtz's reconstruction of the phenomenon of contrast, when two colours (e.g. black and white) are perceived as more intense because of their position next to each other, this resulting perception is the product of an *unconscious judgement* of comparison. According to Fechner's own "modification of the sensibility" account, when black and white are next to each other they *immediately appear* "blacker" and "whiter" than when perceived in isolation. For Fechner, the moment of judgement or comparison comes *after* the psychical impression of colours displayed in physical continuity: it is the original perception of contrast which causes the judgement that they

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<sup>104</sup> Fechner 1860, II, 564-9: „Zusatz über einige in die Psychophysik einschlagende neuere Untersuchungen von Helmholtz.“

<sup>105</sup> The first book of the *Handbook* had been published separately in 1856.

<sup>106</sup> Fechner 1860, 568: „...ob die Hebung der Eindrücke durch den Contrast bloß auf einem *Acte des Urtheiles* oder auch auf einer *Abänderung der Empfindlichkeit* beruhe.“ Emphasis added.



are more intense,<sup>107</sup> while for Helmholtz it is the *activity of comparing, i.e. judging* between two colours which makes us perceive them as more intense when they sit next to each other (Fechner 1860: 106).

In the next section, I illustrate Helmholtz's inferential account of perception more in detail and make a case for Helmholtz's influence over Peirce's notion of scientific method.

### 3.3 Helmholtz's inferentialism and Peirce

Helmholtz's philosophy is generally considered a kind of empiricism and contrasted to the "innatism" of his mentor, Johannes Müller (Lenoir 1993: 112-121) and the transcendentalism of Kant. The peculiar empiricism of Helmholtz is situated in the context of a renewed attention for Kant's philosophy (mediated by Herbart's operational psychology) and the "pragmatic turn" of Immanuel Fichte, the son of Johann Gottlieb Fichte (Lenoir 1993: 125). In the following, I limit myself to an illustration of Helmholtz's inferential theory of perception and of his influence on Peirce's.

Helmholtz's first public engagement with Kant's philosophy was in 1855, in a lecture in honour of Kant held at Königsberg. There, Helmholtz presented Kant as a science-friendly philosopher, in implicit contrast with idealist philosophy and Arthur Schopenhauer (1788-1860).<sup>108</sup> Practicing scientists could make good use of Kant's

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<sup>107</sup> „...das Weiss wirklich absolut heller, das Schwarz dunkler erscheint, als *in continuo* allein ins Auge gefasst, so dass beide mit diesen abgeänderten Werthen zur Bestimmung des Vergleichsurtheiles selbst erst wirken.“ In English: "...white appears brighter in itself, Black darker when they are perceived in a single look, so that the comparison is made on their already changed appearance.”

<sup>108</sup> In "The Facts of Perception," Helmholtz mentioned Schopenhauer's use of "unconscious inferences" (or "conclusions") [Schlüsse] as a reasons for avoiding the term after his initial adoption in 1867: "Later I avoided the term, "unconscious conclusions," in order to escape from the entirely confused and unjustified concept – at any rate so it seems to me – which Schopenhauer and his disciples designate by this name. We are obviously concerned here with a basic concept which underlies all that truly can be called thinking, although it lacks the critical sifting and competition of individual steps found in the scientific formulation of concepts and ideas" (Helmholtz 1879; Eng. tr. 1968: 220). As Araujo (2016: 70) reports, Schopenhauer introduced the notion of unconscious inference in perception in the essays *On the Fourfold Root of the*

philosophy, Helmholtz maintained; the secret consisted in not taking Kant's propositions dogmatically, but rather adapting them to the progress of science. Treating Kant as a living interlocutor, Helmholtz believed that Kant's philosophical statements could be refined or updated by science. Helmholtz made his relation to Kant even more explicit in a later address, "The Facts of Perception" [Die Thatsachen in der Wahrnehmung], delivered at Berlin University in 1878 and published a year later:

...I have often stressed [...] the agreement of modern sensory physiology with Kant's doctrine, but of course I do not mean by this that I have to swear by the words of the master in all minor points. I believe that the analysis of the concept of intuition into the elementary processes of thinking must be regarded as a substantial advance of recent times. This is lacking in Kant and thus he constructed the axioms of geometry to be transcendental propositions. (Helmholtz 1879. Eng. tr. 1968: 228).

Here, Helmholtz revindicated both the right to use Kant's work to enhance his own research and the relevance of Kant's philosophy for the science of the time (of which he was an undiscussed representant). Moreover, Helmholtz maintained that some of Kant's theses – for instance, that time and space are a priori forms of the intuition – could and should be updated by more recent scientific findings. Such findings, according to Helmholtz, suggested that time and space are not a priori structures, but rather empirical ones, emerging from unconscious inferences. Kant's recourse to the a priori is interpreted by Helmholtz as the product of a lack of empirical evidence to back up his otherwise insightful analysis of the process of perception.

Following Kant, Helmholtz considered perception as the result of a constructive activity, a thesis that he exemplified with the case of binocular vision (1855: 26). Moreover, Helmholtz equated Kant's rejection of the possibility of knowing things "in themselves" with the perceptual impossibility of knowing anything in an immediate way. For Helmholtz, all our knowledge is only knowledge of the effects that such objects produce on us, i.e. (in Kantian terms) appearances, phenomena: "...we never perceive the

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*Principle of Sufficient Reason* (1847) and *On Vision and the Colours* (1754). The astronomer Friedrich Zöllner (1834-1882) also affirmed that unconscious inferences had been introduced by Schopenhauer and taken up by Helmholtz (Zöllner 1872: 344). Helmholtz's own father eventually came out to defend him from the allegation of plagiarism (Koenisberger 1902: 278).

objects of the outer world immediately, instead we only perceive the effects of these objects on our nervous systems” (Helmholtz 1855: 40).<sup>109</sup> According to Beiser (2014: 200), “Helmholtz is far from thinking that we perceive the world just by having sensations; he goes on to consider some of the many psychic acts of inference and judgement—most of them automatic and subconscious—necessary to convert sensations into perception. The very content of perception, he argues, is formed by inference and judgement.”

While Helmholtz hinted at an inferential structure of perception when illustrating the case of colour contrast perception in the v.2 of his *Optik*, he returned to unconscious inferences at greater length in v.3, Chapter 26, which is “about perceptions in general.”<sup>110</sup> The Chapter opens with a strikingly pragmatic description of the process of visual perception:

We *use* the sensations [Empfindungen], which light provokes in the visual system, *to build from them* representations [Vorstellungen] about the existence, form and position in space of external objects. (Helmholtz 1867: 427. Emphasis added).<sup>111</sup>

Since the first sentence, Helmholtz drove his reader’s attention from our sensations to our use of them. Starting with the observation that our sensations are actually built into useful information about our surroundings, Helmholtz moves to enunciate his “general law of visual perception”: we always represent to ourselves the objects in our field of vision *as they should be* when perceived under familiar circumstances, i.e. when our eyes are working normally and the conditions of vision are the usual ones (Helmholtz

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<sup>109</sup> Helmholtz 1855, 40: „wir nehmen nie die Gegenstände der Aussenwelt unmittelbar wahr, sondern wir nehmen nur Wirkungen dieser Gegenstände auf unsere Nervenapparate wahr...“

<sup>110</sup> „Von den Wahrnehmungen im Allgemeinen.“

<sup>111</sup> „Wir benutzen die Empfindungen, welche Licht in unserem Sehnervenapparate erregt, *um uns aus ihnen* Vorstellungen ueber die Existenz, die Form, und die Lage aeussere objecte *zu bilden*.“ Compare with the passive translation of Warren & Warren, 1968, 171: “The sensations aroused by light in the nervous mechanism of vision enable us to form conceptions as to the existence, form and position of external objects.” In this rendering, sensations aroused by the nervous mechanism are not better specified “enabling” elements that linger around until we form, in some mysterious way, ideas about external objects.

1867: 428-9). But how can the normative element implied in a “law” of perception be enforced in a process which happens outside our control, as perception does?

For Helmholtz, perception’s criteria of truth are our practical interests and interactions with the world. Firstly, we learn to give attention to the stimuli we receive, and among all, we accord preference to those stimuli which give us access to the outer world (Helmholtz 1867: 432).<sup>112</sup> Indeed, Helmholtz notes, our proficiency in recognising stimuli and representing them as objects makes it hard if not impossible to bring our attention back to the stimuli themselves and to observe our stimuli “in themselves” [*an sich*] (Helmholtz 1867: 431-2; 434).<sup>113</sup> A disruption of the habitual conditions of perception can result in perceptual illusions, which Helmholtz interpreted as an attempt of the nervous system to see what there *should* be but is not there. The disruption of perception habits can also disclose the possibility to perceive the terms of the unconscious inference of perception – i.e., stimuli that usually are blended together in coherent sensations (Helmholtz 1867: 433-4).

In sum, for Helmholtz perception is an activity which involves *experience* (familiarity, usual conditions) and *purpose*. At a lower level, i.e. before consciousness, the “psychical acts” that constitute perception effectively make a “judgement” about the stimuli coming to the nervous system and organise them according to the template that experience has taught them. In Helmholtz’s words, sensation are *unconscious conclusions*:

The psychical acts through which we reach the judgement that a certain object, with a certain constitution, is available to us outside us, in a particular place, are generally not conscious acts, but rather unconscious ones. From the point of view of their result, such acts are identical to conclusions, in so far

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<sup>112</sup> „Wir müssen also erst lernen, unseren einzelnen Empfindungen die Aufmerksamkeit zuzuwenden, und wir lernen dies für gewöhnlich nur für die Empfindungen, die uns als Mittel zur Erkenntniss der Aussenwelt dienen. Nur zu diesem Zwecke haben die Sinnesempfindungen eine Wichtigkeit für uns im gewöhnlichen Leben [...]“

<sup>113</sup> Archive ed., 434: „Beispiele dieser Art würden sich noch viele häufen lassen. Sie alle zeigen, dass wir ausserordentlich gut eingeübt sind, aus unseren Sinnesempfindungen die objectiven Beschaffenheiten der Objecte der Aussenwelt zu ermitteln, in der Beobachtung unserer Empfindungen an sich aber vollständig ungeübt, und dass uns die eingeübte Beziehung auf die Aussenwelt sogar hindert, die reinen Empfindungen uns deutlich zum Bewusstsein zu bringen.“

as from the observed effect on our senses we gain the representation of a cause of this effect, while, as a matter of fact, we always perceive only the stimulation of the nerves directly, i.e. the effects [of stimulation], but never the external objects. (Helmholtz 1867: 430).<sup>114</sup>

That something is there (existence), the shape it has (form) and where it is (position in space) are key information for determining the *availability for us* of a certain portion of reality. This portion of reality is generally represented as an object. The object does not dawn immediately on us; rather, perception is the process of purposefully putting stimuli together, and its outcome is the object that we perceive. The representation of some stimuli as an object occurs firstly in sensation. Sensation, the result of perception, appears thus as the product of an *unconscious inferential activity*: individual objects are *in themselves* unknowable causes of our perception, and in the process of perception they become *for us* a conclusion. The syllogism of perception has for premises the initial stimulation of our sensory receptors and sensation as its final outcome.

Helmholtz was aware of the awkwardness involved in articulating the notion of “unconscious inferences.” Inferences are logical processes, and logic would need, it seems, consciousness, together with the ability to justify and control reasoning. Still, Helmholtz insisted that, from the point of view of the result of the inferential process, it made no difference whether this process was conscious (performed by reasoning) or unconscious (performed by sensibility). He illustrates this point with a metaphor where visual perception is compared to the observational activity of an astronomer:

...for instance, we have conscious inferences when an astronomer calculates the position of the stars in space, their distance from Earth and so on, from the perspective images he has had of them at various times and as they are seen from different points of the Earth's orbit. His conclusions are based on a

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<sup>114</sup> „Die psychischen Thätigkeiten, durch welche wir zu dem Urtheile kommen, dass ein bestimmtes Object von bestimmter Beschaffenheit an einem bestimmten Orte ausser uns vorhanden sei, sind im Allgemeinen nicht bewusste Thätigkeiten, sondern unbewusste. Sie sind in ihrem Resultate einem Schlüsse gleich, insofern wir aus der beobachteten Wirkung auf unsere Sinne die Vorstellung von einer Ursache dieser Wirkung gewinnen, während wir in der That direct doch immer nur die Nervenerregung, also die Wirkungen wahrnehmen können, nemals die äusseren Objekte.“ (Helmholtz 1867: 430).

conscious knowledge of the laws of optics. Such a knowledge of optics is missing however from the ordinary act of seeing. Still it might be permissible to speak of the psychic acts of ordinary perception as unconscious conclusions, since this name distinguishes them enough from the common so-called conscious conclusions. Even if the similarity of the psychical act in the two processes has been object of doubt, and perhaps will still be doubted, nonetheless the similarity of the result of such unconscious inference with the conscious one leaves no doubt. (Helmholtz 1867: 430. Translation mine).<sup>115</sup>

The choice of the metaphor is telling. It is a testimony of the long history of the relation between astronomy, optics and theories of vision and it nods to the connection between astronomical and psychological research of the time.<sup>116</sup> Moreover, this metaphor establishes a deep connection between scientific observation and ordinary vision and justifies the attribution of an inferential structure to perception with an argument from the *similarity* of the two conclusions. When the *unconscious inference* steps in, organising the sensory data according to the “general law of visual perception,” it attributes the received stimuli to the object most likely to have produced them given the circumstances.

While sensations are for Helmholtz at best a *symbol* of the underlying reality, whose objects remain accessible only through the mediation of our senses, there is no requirement of similarity between the sensation and the reality that allegedly caused it. As Helmholtz put it, “the relation between them is confined to the fact that the same object, acting under the same circumstances, will produce the same symbol; and that

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<sup>115</sup> „...bewusste Schlüsse sind es zum Beispiel, wenn ein Astronom aus den perspektivischen Bildern, welchen ihm die Gestirne in verschiedenen Zeiten und von verschiedenen Punkten der Erdbahn aus dargeboten haben, die Lage derselben im Weltraum, ihre Entfernung von der Erde u.s.w. berechnet. Der Astronom stützt seine Schlüsse auf eine bewusste Kenntniss der Sätze der Optik. Eine solche Kenntniss der Optik fehlt bei den gewöhnlichen Achten des Sehens. Indessen mag es erlaubt sein, die psychischen Acte der gewöhnlichen Wahrnehmung als unbewusste Schlüsse zu bezeichnen, da dieser Name sie hinreichend von den gewöhnlich so genannten bewussten Schlüssen unterscheidet, und wenn auch die Aehnlichkeit der psychischen Thätigkeit in beiden bezweifelt worden ist, und vielleicht auch bezweifelt werden wird, doch die Aehnlichkeit der Resultate solcher unbewussten und der bewussten Schlüsse keinem Zweifel unterliegt.“ (1876, 430; Eng. tr. 1968: 174).

<sup>116</sup> I expand on this point in Ch. 4.

unlike symbols thus always correspond to unlike influences” (Helmholtz 1879; Eng. tr. 1968: 212-3). Thus, the reality of symbols is not derived by their ability to represent an object as copies but by expressing regularity – what Helmholtz calls “lawfulness.”

This passage is of course highly suggestive if read with Peirce’s theory of perception and of his logic of signs in mind. It is important not to let some analogies carry us too far: Peirce’s many classifications of signs were not based on a psychological inquiry into the conditions of perception, nor were they justified with arguments from perception. If Peirce’s theory of signs evolved continuously through the years, Helmholtz’s interpretation remained unchanged. This suggests that although Helmholtz used a theory of signs, he did not make it an object of inquiry.

Peirce distinguished different kind of signs, admitting for signs whose essential relation with their objects was a relation of similarity (icons), signs who would merely point at objects without describing them (indices), and finally general signs, representing the lawfulness of an occurrence (symbols).<sup>117</sup> However, when in 1871 Peirce reviewed Fraser’s edition of *The Works of George Berkeley*, he described sensations as signs, following Helmholtz’s use of the term and praising the insight – attributed to Berkeley too – that “the sensations which we have in seeing are signs of the relations of things whose interpretation has to be discovered inductively” (W2: 484).

In the following, I bring evidence to evaluate the extent and the effects of Helmholtz’s influence on Peirce. As it appears, Helmholtz’s influence does not regard distinctions between different types of signs but rather unconscious inferences in perception and the method of science, possibly touching also on Peirce’s original formulation of the pragmatic maxim. This latter suggestion comes from a crucial testimony of Helmholtz’s influence over Peirce: Stanley Hall’s<sup>118</sup> 1879 review “Philosophy in the United States” (Fisch 1965/1986: 132). There, Hall introduced Peirce’s

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<sup>117</sup> For a thorough discussion of the evolution of Peirce’s terminology and distinctions, see Bellucci (2019).

<sup>118</sup> Stanley Hall (1846-1924) developed the laboratory of experimental psychology at Johns Hopkins and would become the first president of the American Psychological Association. Hall and Peirce were briefly colleagues at Johns Hopkins University (1879-1884) and remained in friendly terms even after Hall was chosen over Peirce – and also over William James – for the philosophy professorship (W4: xl).

*Illustrations* as the result of a long-standing interest in the logic of science. He further praised them as “one of the most important contributions to philosophy” from the States:

About a year ago Mr. C. S. Peirce, assistant in the United States Coast Survey, began in the *Popular Science Monthly* a series of papers entitled “Illustrations of the Logic of Science,” which is still progressing. The author is a distinguished mathematician, and *this discussion, in which he long ago interested himself, promises to be one of the most important of American contributions to philosophy.* (Hall 1879: 101-2. Emphasis added).

While giving an overview of “How to Make our Ideas Clear,” Hall inserted a reference to Helmholtz’s textbook in physiological optics: “Cf. Helmholtz, *Physiol. Optik*, ss. [pp.] 431-443” (Hall 1879: 102). Those pages belong to Chapter 26, “On Perceptions in General,”<sup>119</sup> where Helmholtz theorised the unconscious and inferential structure of perception. Moreover, Hall inserted the reference to Helmholtz just after summarizing one of the most famous passages of Peirce’s paper: the illustration of the rule for “attaining the third degree of clearness” of ideas (W3: 266), later popularized by James as the pragmatic maxim.<sup>120</sup> This reference brings the topic of unconscious inferences in perception closer to the practical underpinning of Peirce’s theory of meaning and truth. As seen above, for Helmholtz the accuracy of our perceptions develops in accordance to our practical interests and interactions with the world. Likewise, for Peirce in 1878 the meaning of a conception is the sum of its practical effects:

...let us ask what we mean by calling a thing *hard*. Evidently that it will not be scratched by many other substances. The whole conception of this quality, as of every other, lies in its conceived effects. (W3: 266. Emphasis of the text).

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<sup>119</sup> „Von der Wahrnehmungen im Allgemeinen.“ Although the section specifically dedicated to unconscious inferences (Helmholtz 1867: 447-457) is outside Hall’s quote, the quote remains Helmholtz’s treatment of perception in general.

<sup>120</sup> See James (1907), Lecture II, “What Pragmatism Means.” Peirce’s 1878 definition was: “Consider what effects, which might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object.” (W3: 266).



For Peirce, the notion of “hardness” is fully explained by its “conceived effects;” however, as his example makes clear, such effects are *experimental effects*. By defining hardness as what cannot be easily scratched (and instead is more likely to scratch other substances), Peirce is giving a procedural definition for how to test the hardness of a material in a laboratory setting.<sup>121</sup> Peirce is not thereby denying that we could have different definitions of hardness according to different criteria: this example is meant to illustrate the “third degree of clearness” that ideas can reach, which means that at least other two are available. Similarly as with the “fixation” of belief, where the method of science is one among other possible methods,<sup>122</sup> in “How to Make our Ideas Clear” ideas can be clarified in different ways. Peirce’s preference is for the method of science, which indeed connects experimental inquiry and purpose-oriented perception.

Peirce drafted this connection already in his Berkeley review of 1871, which allowed him to discuss his theory of perception in relation to contemporary scientific theories and philosophies. In it, Berkeley became a signpost for Helmholtz’s theory of perception. To see this, it is necessary to take a closer look at Peirce’s argument on Berkeley, starting with Peirce’s disagreement with Fraser on the importance that Berkeley’s philosophy has for modern science. Berkeley would have reduced all mechanical causes to final causes, however final causes are not the ones modern science looks for:

Now science, as we all know, is generally hostile to the final causes... the claim [...] for Berkeleyanism, that it is especially fit to harmonize with scientific thought, is as far as possible from the truth. (W2: 482).

It is not Berkeley’s philosophy, but his *theory of vision*, which Peirce considered relevant for modern science. Peirce described Berkeley’s theory of vision as “an extraordinary piece of reasoning, and might have served for *the basis of the modern science*” (W2: 484; emphasis added). According to Peirce, Berkeley’s theory of vision did not, historically, perform the function that it could have assumed from its theoretical

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<sup>121</sup> This was not Peirce’s original definition of “hardness.” It comes from mineralogy and it is still part of our dictionary. The Webster’s New World College Dictionary (2014) defines “hardness” as “2. the relative capacity of a substance for scratching another or for being scratched by another.”

<sup>122</sup> I examined “The Fixation of Belief” in Chapter 2.

presuppositions, since “in Germany [...] Berkeley is little known and greatly misunderstood” (W2: 484). Helmholtz himself, who, according to Peirce, “has done more than any other man to bring the empiricist theory into favour” (W2: 484), did not follow a single philosophical banner. Peirce thus quoted a passage from Helmholtz’s *Optik*, where Helmholtz stated that “Our knowledge of the phenomena of vision is not so complete as to allow only one theory and exclude every other” (W2: 484). Nonetheless, Peirce saw the modern science of vision as in close continuity with Berkeley’s theory of vision. The “empiricist hypothesis,” which Peirce attributed to Berkeley and to the “best authorities” of his day alike, strikes for its similarity with Helmholtz’s theory of perception:

The best authorities, however, prefer the empiricist hypothesis; the fundamental proposition of which, as it is of Berkeley’s, is that the sensations which we have in seeing are signs of the relations of things whose interpretation has to be discovered inductively. (W2: 484).

Peirce would have seen in Helmholtz’s “authority” on perception a corroboration of his own account of perception and of his inferential logic of science. The “empiricist hypothesis” comes very close also to Helmholtz’s symbolic interpretations of perception (discussed above). Moreover, Helmholtz’s idea of reality as lawfulness displayed in perception rings familiar with Peirce’s later notion that we *perceive* generality.<sup>123</sup>

There is a last, important point of Helmholtz’s influence in Peirce’s (and James’) theory of perception. This influence concerns space-perception. As seen above, Helmholtz argued that the Kantian account of space as an a priori structure of experience was surpassed by science, which would show instead that the notion of space was an inferential construction resulting from our interaction with the world. Helmholtz pushed his inferentialism to the point of arguing for the possibility of *perceiving* non-Euclidean spaces in the imagination and (conversely) that geometrical imagination could bring about new perceptual possibilities:

The task of imagining the spatial relations in meta-mathematical spaces certainly requires some practice in the understanding of mathematical methods, of perspective constructions, and optical phenomena. This however

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<sup>123</sup> See Cristalli and Pietarinen, *forthcoming*, and Ch. 6 of this work.

contradicts the older concept of sense perception, which recognizes as sense perception only that which comes to consciousness without reflection and effort, simultaneously with the sensory impression. [...] Indeed, our attempts to imagine mathematical spaces do not have the ease, the speed, the lightning-like assurance with which we perceive, for example, the shape of a room entered for the first time [...]. But now, if we reflect further, we are struck by a host of cases which show that reliability and speed of occurrence of specific mental images upon specific stimulation also may be acquired where no such connection exists in nature. One of the most striking examples of this kind is the understanding of our mother tongue. (Helmholtz 1879; Eng. tr. 1968: 219).

Of note is the analogy between learning to perceive mathematical spaces and learning a language: while Euclidean space could be compared to our mother tongue, which we forget to have learned at all, non-Euclidean spaces can be learned like foreign languages, where we move slowly and uneasily. This accentuates the symbolic character that the perception of space had for Helmholtz.

Such an account of space was vigorously opposed by William James. In his 1887 “The Perception of Space,” James “...established or sought to establish is the existence of the vague form or quale of spatiality as an inseparable element bound up with the other qualitative peculiarities of each and every one of our sensations” (James 1887: 10). Helmholtz’s inferential account instead separated perception from its “qualitative peculiarities,” effectively turning those qualities in signposts of some underlying regularity. James criticised the hyper-intellectualism of this account, claiming that it was not true to experience; and in this criticism of Helmholtz James would also criticise Peirce’s inferential and logical approach to perception.

## Conclusion

In this chapter, I explored the different declinations of inferentialism in perception in the thought of German philosophers and psychologists who all had an influence in Peirce. In particular, I looked at Kant’s account of the object of psychology and at his claim that psychology could never become a science properly so called, and at the solutions that some post-Kantian philosophers proposed to adapt or overcome Kant’s

arguments. This opens up a different argument on the legacy of Kant's thought for American pragmatism and specifically for Peirce. In a context in which Germany was the leading Western country in psychological research, it is natural that philosophical ideas would have passed over more easily through the medium of psychology, which in any case was openly and intentionally linked with philosophical investigation.

Through the figures of Kant, Herbart, Fechner, and Helmholtz I also provided a historical and philosophical background to these four cornerstones of Peirce's philosophy and psychology: (1) envisaging reality as what resists us and as lawfulness; (2) the notion of degree in perception; (3) an inferential and symbolic account of perception; (4) the notion of threshold of perception. As mentioned in the *Introduction*, these points cannot be considered in isolation: they are deeply interrelated and they share common features.

In the next chapter, some of these notions – particularly the notions of threshold and of degree in perception, but also the ever-present inferential account of perception – will be directly investigated by Peirce in his 1885 paper (with Joseph Jastrow) *On Small Differences in Perception*. Moreover, I illustrate the proximity between measurements in astronomy (with particular regard to *Photometry*) and measurements in psychology, showing how the instruments used in a science not only direct research in it but also shape its object.

# Chapter 4. Peirce's Experimental Psychology, 1878 – 1885

Ces petites perceptions sont donc de plus grande efficace qu'on ne pense.

Leibniz, *Nouveaux Essais sur l'Entendement Humain*, 1765 : 54.<sup>124</sup>

## Introduction

The aim of this chapter is to situate Peirce's theory of inquiry in the context of his engagement with experimental psychology.<sup>125</sup> Peirce's first published paper in experimental psychology was his 1877 "Note on the Sensation of Color" (W3: 211-6), and, as the editors of the *Writings* report, Peirce was carrying on founded psychological research as early as 1875 (W3: 524).<sup>126</sup> However, Peirce's familiarity with experimental psychology and his independent and ingenious use of its principles in different contexts can be traced as far back as 1873, in the Coast Survey report "On the Theory of Errors in Observation" (W3: 114-137). There, while carrying out the task to explain the statistical method of least squares to geodesists, Peirce also managed to use very refined experiments inspired by Fechner's law of psychophysics to illustrate the use of statistics in studying the distribution of errors in observation (W3: 133-7).<sup>127</sup>

In 1884, while a part-time lecturer in logic at Johns Hopkins (a position he held from 1879 to 1884), Peirce conducted with Joseph Jastrow – then a PhD student – an experiment on differences in sensations which aimed to refute the core idea of Fechner's

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<sup>124</sup> "These small perceptions are thus of greater consequence than one may think."

<sup>125</sup> Parts of this chapter appeared in print in Cristalli (2017).

<sup>126</sup> Peirce (W3: 524): "On 25th October 1875 Peirce received two grants [...], one to study color (\$1,200) and another to compare sensations (\$500)." The *Note* on colour had a certain diffusion, since it was published both in the U.S. and in the U.K. As I illustrate in sec. 4.1, the study of colour perception was indeed important both for Peirce's contribution to experimental psychology and to his contribution to photometry.

<sup>127</sup> I expand on those early experiments in relation to abstraction in science in Cristalli and Pietarinen, "Abstraction, Generalization and Peirce's Diagrams: Scientific practice and logical analysis in the 19th-century methods of science," *forthcoming*.

psycho-physics: the existence of a threshold in sensation.<sup>128</sup> On the one hand, experimental psychology was Peirce's opportunity to put the inferential structure of perception, hypothetically assumed as the basis of all cognitive functions, to a test. On the other hand, following the path traced in Peirce's own theory of inquiry, the experimental test acted as a prod to refine and further develop his logic of science.

The early constitution of Peirce's inferentialism – examined in Ch.1 – and the role of inference in a logic of inquiry – seen in Ch.2 – constitute an important philosophical background to this chapter. The 1877-8 *Illustrations* were issued at the same time than Peirce's *Photometric Researches* (1878); and in 1882, at Johns Hopkins, Peirce further articulated his logic of science as a “method of methods” (W4: 378), i.e. a tool that would allow the scientist to apply methods of well-established disciplines to other fields of inquiry (W4: 380). In part, this is what happened with Peirce's own practice as an experimental psychologist, and Peirce explicitly stated that “logic can never be learned from logic-books or logic lectures. *The material of positive science must form its basis and its vehicle*” (W4: 381). In Peirce's case, the adoption in a new science of a method elaborated for another science happened specifically in relation to astronomy and psychology.

In a 1973 symposium on “The first generation of American psychologists” held at the meetings of the Eastern Psychological Association,<sup>129</sup> Thomas C. Cadwallader celebrated Peirce as “the first American experimental psychologist,” a praise later echoed by Max Fisch (W3: xxvii). This chapter shows that Peirce's engagement with experimental psychology contributed substantially to the work he was carrying out at the Harvard observatory. Peirce turned to experimental psychology in his more famous work as a physical scientist; at the same time, Peirce applied the physical scientist expertise in measuring and setting up experiments to psychology. In sum, Peirce was at the forefront of research when doing psychology experimentally and he was still at the forefront of research when doing photometry with a little help from psychology.

The first section (4.1) engages with Peirce's *Photometric Researches* (1878) illustrating the fruitful integration of astronomy and experimental psychology in Peirce's early scientific work. While highlighting what Peirce himself considered his original

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<sup>128</sup> I introduced Fechner's notion of threshold in Ch. 3; in this chapter, I illustrate his law more in detail.

<sup>129</sup> The meeting was held in Washington, D. C., May 4, 1973.

contribution to the field of photometry – namely, the application of his findings about colour perception to it – I situate Peirce’s interdisciplinary research in the broader context of the relation between astronomy and psychology in the nineteenth century, a relation that has been the object of debates among scholars and since Edwin G. Boring’s 1942 reconstruction of it.

Peirce’s most famous and most ambitious work in experimental psychology is the 1885 study “On Small Differences of Sensation,” to which I turn in sec. 4.2. The experiment was praised by Ian Hacking (1988: 431) as a landmark study in the use of randomization and blinding to prevent guessing and unconscious cueing. Perhaps because of those impressive methodological achievements, the 1885 paper was mostly considered another instance of Peirce’s versatile genius. In contrast, I show how its findings and its underlying motivation have deep connections to Peirce’s broader theory of inquiry.

Lastly, in sec. 4.3, I turn at Peirce’s 1882 Johns Hopkins Circular to give an account of his mature theory of inquiry. Imagining the experiment, constructing the setting and assessing the possible error are the three fundamental activities of Peirce’s method of research. The first two can be accomplished by adopting the method developed for one science to another one, while the assessment of possible error brings with itself a challenge to all claims of absolute validity of laws or axioms. Indeed, the notion of fallibilism is a cornerstone of Peirce’s later epistemology. Eventually, Peirce’s epistemology and psychology come together in the articulation of a metaphysics of chance and of continuity,<sup>130</sup> which blurs another “axiom” of classical epistemology: the notion of individual.

#### 4.1 Peirce between astronomy and experimental psychology

Although the observations constituting the *Photometric Researches* were undertaken in the years 1872-1875, the finished book only appeared in 1878,<sup>131</sup> almost at the same time as the *Illustrations of the Logic of Science*. Peirce’s work on the logic of

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<sup>130</sup> The relation between continuity and Peirce’s mature theory of perception is the topic of Ch. 6.

<sup>131</sup> Now partially reprinted in W3: 488-90 (chapters 1, 3, and 5 and the the five plates, which were included at the end of the *Photometric Researches*). All quotes are from the original 1878 book. Particularly interesting for the present discussion are plates 1-3: a diagram with the comparison of magnitude scales of different observers (1), the photometer (2), and the photometer observatory (3).

science run parallel to his innovations in photometric observation, where he introduced a new scale to classify the brightness of stars. Such scale was to be derived from an original integration of his own research in colour perception, Fechner's law of the threshold of perception, and a huge set of observations, partly made by himself and partly historical, on the stars' luminosity. Peirce's professional role as an experimental physicist and astronomer enabled him to gather the expertise in measurement and precise observation which he employed in psychology; in turn, his investigations in colour perception supported the elaboration of his new photometric scale. This connection is both contributing to the understanding of Peirce's philosophy and to the broader discussion in history of science concerning the relation between experimental psychology and astronomy.

Peirce was appointed regular aid in the Coast Survey in 1861, i.e. four years before the Harvard lectures of 1865. In 1870 Peirce received his first Coast Survey assignment to travel to Europe, and it is during another trip to Europe on behalf of the Coast Survey, in 1876, that Peirce started a notebook recording, among other things, experiments on colour perception and reflections on inquiry and its "leading principle" (Cologne Notebook, MS 1018). Again, reflections on the method of science and scientific observations went hand in hand.

In 1869, Peirce wrote to his father Benjamin on Fechner's 1860 *Elemente der Psychophysik* [Elements of Psychophysics]<sup>132</sup> bringing its methodological sections to his father's attention.<sup>133</sup> Peirce's work for the Harvard Observatory started in that same year. A year after, he published "On the Theory of Errors of Observation" (1870; W3, 114-160). The theory of errors, developed by Lagrange (1805; 1810) and Gauss (1809) for

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<sup>132</sup> Fechner's *Elemente* is a text which was regarded already by his contemporaries as the foundation of experimental psychology (James 1890; Wundt 1901).

<sup>133</sup> Charles S. Peirce to Benjamin Peirce, July 1868: "Here is Fechner's [Elementer der] *Psychophysik*. See vol. I pp. 72 and 93 et seq. He says he practised the experiment of saying which of two slightly differing weights is the heavier for an hour a day for several years & that his results agreed with the method of least squares. He promises to publish his experiments in another book which has never appeared as far as I can learn. Concerning "Schwelle" or the point where the perceptibility of a stimulus begins see pp. 238-300...." (in Fisch [1965] 1986: 119-20).



astronomy,<sup>134</sup> became a methodological cornerstone for Peirce's experimental research in a variety of fields, from photometry to geodesy to experimental psychology in 1885 (as I illustrate in sec. 3.2). Peirce introduced Fechner's law into photometry as part his strategy to reduce errors in the classification of the brightness of stars. Thus, in Peirce's case both the statistical theory of errors and psychophysics played a role in trying to minimize errors of observation.

The problem of reliable observations in astronomy was theorised in 1820, when the German astronomer and mathematician Friedrich Wilhelm Bessel (1784–1846) described the discrepancy in observation time found even between skilled observers measuring the time of transit of a celestial body (Schaffer 1988). Bessel showed that every observer introduces in the observation a margin of error, their "personal equation." According to a historiography of psychology dating back to Boring (1942), empirical psychology played an essential role in reforming the notion of observation and the methods to take errors in observations into account. In the 80s, however, scholars reacted to this narrative, claiming that Boring's account did not represent the actual power dynamics between astronomy and empirical psychology (Schaffer 1988).

The idea that experimental psychology contributed to the progress of astronomy was undoubtedly flattering for the new-born academic discipline of psychology; the only problem being that astronomers did not, in fact, need empirical psychologists to introduce or validate methods for dealing with errors in observation. According to Schaffer (1988), astronomers reacted to the problem posed by the human observer's inconsistency by (1) policing observers more strictly, as in the case of the Greenwich observatory, and (2) by working for the development of more sophisticated instruments that would reduce the dependency of the observation on the observer's personal reaction time. The introduction of the galvanic clock, for example, greatly reduced the amount of errors and was widely adopted in Europe (Schaffer 1988). In the States, Benjamin Peirce, Charles's father, pushed for the introduction of galvanic clocks at the Harvard Observatory (Hetherington 1983: 75-6). Moreover, Adolph Hirsch (1830-1901), a Swiss astronomer, contributed to the measurement of reaction times with the chronoscope developed by the precision mechanic Mathias Hipp (1813-1893).

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<sup>134</sup> See Stephen M. Stigler (1986: 139-158), for a history of statistics which considers it the "cross-disciplinary logic of empirical sciences" (Stigler 1986: 8); Michael Cowles (1989) for a history of statistics in psychology.

Eventually, some of these technological innovations will be transferred from the astronomers' observatory to the psychologists' laboratory (Robinson 2001). Hirsch's study was fundamental for Wundt's research program at Leipzig (Robinson 2001: 164). In the early 1870s, (Charles Sanders) Peirce inverted the trend of borrowing technology and methods from astronomy to experimental psychology. He introduced Fechner's psycho-physical law in photometry and used it to revise *all* systematic records of observations of the relative brightness of stars available: Ch. 2 of the *Photometric Researches*, "On the numbers of Stars of Different Degrees of Brightness," opens with an historical reconstruction of how stars were catalogued since Ptolemy. Thus, not only psychology, but the history of science too was part of Peirce's research in photometry.

After reducing the long history of observations to a uniform – and thus comparable – set (1878: 7-12), Peirce noted that there was a tendency to establish scales of measurement that classified stars according to a constant increment in their brightness, which confirmed the relation between increments in stimuli and corresponding increments in sensation observed by Fechner. Indeed, "it happened as a natural consequence of Fechner's psychophysical law that the ratio of light between successive magnitudes was approximately constant" (1878: 7). And Peirce went on: "Of course *the observer would desire* to have just as much difference between the 4<sup>th</sup> and the 3<sup>rd</sup> magnitude as between the 3<sup>rd</sup> and the 2<sup>nd</sup>; and *equal differences of sensation correspond nearly to equal ratios of light*. So powerful is this natural influence that even Sir John Herschel's scale, which was conceived by its author to conform to a very different photometric law, really does confirm to this and not to the one which he desired to follow." (1878: 7; emphasis added).

Peirce introduced and discussed Fechner's law in Ch.1, "On the Sensation of Light," where he provided some theoretical background for the use of empirical psychology in photometric research. Photometry, according to Peirce, is a science which investigates light not as it may be in itself, in its "*noumenal*" or purely physical character (1878: 2), but rather "as an appearance, and as a function of sensation," such that "it may be termed *phenomenal light*" (1878: 2. Emphasis of the text). Peirce considered spectroscopy the scientific investigation of light from its "*noumenal*" perspective; photometry instead was the scientific investigation of light as it is perceived, thus involving a combination of physiological, psychological, and physical notions about colours.

Peirce claimed to be building on Maxwell's 1860 "On the Theory of Compound Colours, and the Relations of the Colours to the Spectrum," and on a paper of his in which he would expand Maxwell's treatment of compound colours in 1872 to the *American Academy of Arts and Sciences*.<sup>135</sup> Maxwell's paper of 1860 explicitly aims at integrating physiology and physics:

...the results to which the investigation leads must be regarded as partaking of a physiological, as well as of a physical character, and as indicating certain laws of sensation, depending on the constitution of the organ of vision, which may be different in different individuals (Maxwell 1860: 58).

Peirce's *Researches* also integrate laws of sensation and research on the specific properties of coloured light. In particular, sensation is accounted with the introduction of the Weber-Fechner law, which describes the relation between stimulus and sensation as logarithmic:

$$p = k \ln \frac{S}{S_0}$$

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<sup>135</sup> This paper is not published in W3. Is not on the online archive of the Academy either. Peirce may have been presented the same paper ("On Stellar Photometry") at the American Philosophical Society in Philadelphia on October 19<sup>th</sup>, 1872 (W3: xxvii). Peirce also engages with Fechner's theory in the 1877 "Note on the Sensation of Color" (W3: 211). Other acknowledged sources are von Bezold's "Über das Gesetz der Farbenmischung"<sup>135</sup> [On the Law of Colour Combination] and a paper by Helmholtz of 1852, to which Peirce believes to provide a better alternative in his 1872 address. The editors of W3 identify this paper of Helmholtz with the following: "Ueber die Theorie der Zusammengesetzten Farben," *Poggendorfers Annalen der Physik und Chemie*, 1852 (87): 45-66, also quoted by Maxwell (1860). Peirce however refers to a paper published in the *Archiv für Anatomie und Physiologie*; there Helmholtz published in 1852 the paper "Messungen über Fortpflanzungsgeschwindigkeit der Reizung in den Nerven," 199-216 (the full title of the journal is *Archiv für Anatomie, Physiologie und wissenschaftliche Medicin*). It is possible that Peirce misplaced the reference, since the paper also quoted by Maxwell is relevant also to Peirce's topic, while the one issued in the *Archiv* is not. The confusion may indicate that Peirce simply "adopted" Maxwell's reference to Helmholtz, without a first-hand engagement with it. In any case, it is difficult to understand why Peirce chooses to quote such an old paper from Helmholtz after the *Handbuch der physiologischen Optik* had been published in all its 3 volumes in 1867.

Where  $p$  is the perceived sensation,  $S/S_0$  is the difference in the stimulus, and  $k$  is an empirical constant.

Peirce's proposal was to adopt explicitly Fechner's law for correcting observers' judgements over the luminosity of stars. However, his adoption of Fechner's law was not without reserve; firstly, he objected that Fechner assumed the existence of a fixed threshold, and secondly, Fechner's law did not consider the effect of colours in the perception of intensity. As seen in the *Introduction*, Peirce was deeply interested in colour perception and published his first experimental psychology paper on it (Peirce 1877, W3: 211-6). Thus, it is on the role of colour in photometry that Peirce's integration of experimental psychology and astronomical observation is really original (as Peirce declared in the very title of the Chapter dedicated to colour – "Original Observations"). Fechner had already applied his formula to the perception of stars' brightness in 1860, showing awareness of the relation between the brightness and the size of a star (Fechner 1860, v.2: 107).

Fechner's comments on the applicability of his formula to the study of stars' brightness<sup>136</sup> follows immediately the one on the appreciation of contrast quoted by Fechner himself in his Appendix B as a response to Helmholtz's inferential theory of perception (seen in Ch. 3). Fechner developed an ingenious series of formulas to address the problem of the perception of a star against a given background (the sky), finding a formal way to account for the relative brightness of the star in the sky, and in different conditions. However, he did not account for *colour* as a variable in the perception of the intensity of stars' brightness.

Fechner had already pointed out that an increment in the intensity of a stimulus is easier to notice than a decrease. Peirce confirmed this observation when the stimulus in question is the brightness of a star: observers are more likely to judge a star to be brighter than it actually is, than to do the opposite (Peirce 1878: 10):

There is not, as is generally supposed, any great difficulty in comparing two lights of different colors and deciding which is the brighter [sic.], and the impossibility of accurately comparing the brightness of two lamps or two stars does not lie in the difficulty of the immediate observation. It lies chiefly

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<sup>136</sup> Fechner 1860, Zusatz [Appendix] B, "Anwendung der Unterschiedsmassformel auf die Schätzung der Sterngrössen."

in the fact that a change in the objective light produces less change in the sensation of blue than in those of red and green, so that the warmer colored stars appear relatively brighter on fine, clear nights. (Peirce 1878: 89).

A long description of Peirce's empirical measurement of the differences in colour perception follows. Peirce carried out his observations with a Zöllner's photometer, a small telescope which allowed the observer to have projected on the same plate the actual light of the star under observation and an artificial source of light, a gas flame coming from a Bunsen burner integrated with the telescope structure (Staubermann 2000: 323; 328). The artificial star could then be dimmed or increased at will to match the intensity of the real star. In theory, the artificial star could also be adjusted so as to match the real star in colour. Peirce however gave a detailed report of how this second regulation was not really accurate on a kerosene lamp and was merely introducing another source of error in the observation. He insisted that objects of different colour can be compared in intensity without any loss in accuracy.

Peirce's expertise in colour perception derived from experiments on the photometer and, as it appears in the Cologne notebook (started 1876), from experiments performed with the aid of coloured ribbons observed in different conditions of light. Experiments with coloured ribbons are also mentioned in a 1877 lecture, "On a New Class Of Observations, Suggested From the Principle of Logic":

Here I have 74 pieces of different coloured ribbons each one numbered upon which I have made frequent photometric experiments extending over a period of 12 months. Now I say that red and green can be compared in intensity with a considerable degree of accuracy. (W3: 236).

Peirce's scientific point here is the same that he would make in the *Photometric Researches*: the intensity of colours can be compared across the spectrum. There is no reason for limiting research on the differences of perceptions to e.g. stimuli of the same colour, since the relative intensity of colours can be compared also across the rainbow.

Lastly, even if Peirce adopted Fechner's law to describe the relation between stimuli and sensation in the perception of the intensity of light, he was not without reserves on Fechner's notion of threshold. His ambivalence towards the law already contains, in a nutshell, his later (1885) objections to it:

If a certain force  $x$  applied to irritate a nerve produces a certain sensation, there is perhaps no addition to it  $\delta x$  so slight that the sensation produced by  $x + \delta x$  will not in some slight majority of trials be pronounced more intense than that produced by  $x$ . Nevertheless, a value can be assigned such that if  $\delta x$  is much larger than that, the sensation produced by  $x + \delta x$  will be decidedly more intense than that produced by  $x$ , while if  $\delta x$  is much smaller than that, we shall feel uncertain which is the more intense sensation. (1878: 5).

Fechner's law individuated a fixed limit (threshold) which constituted the minimum amount that could be felt as an increment or diminishing of sensation. Peirce's rejoinder to this was that there may be no such limit, and that sensations may follow the increase and decrease of the stimulus in a constant fashion. The limit thus assumes a practical function: when big enough, it allows a rather secure discrimination between different cases, while if the variation in the stimulus intensity is small enough, our judgement in each individual case will be subject to a greater uncertainty. Joseph Jastrow, Peirce's assistant in his 1885 Johns Hopkins experiment, insisted in 1888 to the *practical* (and only practical, according to him) value of the notion of threshold (see sec. 4.3). Theoretically, the uncertainty of the individual judgements could be overcome, if observation was protracted long enough.

The 1885 experiment will be testing precisely this hypothesis of Peirce's: whether in the long run judgements about variations in stimuli below threshold are more often right than wrong (thereby suggesting that sensation in fact follows the variation in the stimuli continuously) or whether they distribute evenly among right and wrong cases (thereby suggesting that the notion of threshold is an accurate description of the relation between stimuli and sensation). For the purposes of photometric research however, Peirce maintains that Fechner's law can be assumed to be true:

*the (at least, approximate) truth of Fechner's psychophysical law is now fully admitted, that as the vis viva of the exciting force increases in geometrical ratio the sensation increases in arithmetical ratio. [...] this is why we do well fix our scale of magnitudes of stars so that equal increments of the numerical magnitude correspond to equal increments in the logarithm of the light. (1878: 5. Emphasis added).*

If the relation between intensity of the stimulus and intensity of sensation established by Fechner's law holds true at least approximately, i.e. for discrete variations in intensity above a certain minimal unity or threshold, then this law should be taken into account when building a photometric scale.

This historical reconstruction showed how, in the decade 1870-1880, Peirce was actively engaged not only in astronomy and in experimental psychology, but also in the integration of the two disciplines. In photometry, Peirce adopted Fechner's law as a valuable tool in constructing scales for cataloguing the brightness of stars; as I illustrate in the next section, Peirce's method of planning and recording observations in experimental psychology shows direct influence from the well-tried methods of astronomical observation.

#### 4.2 The 1885 experiment *On Small Differences of Sensation*

In 1885 the National Academy of Science published in its *Memoirs*<sup>137</sup> a study conducted by Peirce and Joseph Jastrow (1864-1944) that argued against an already classic principle of psychophysics: the threshold principle. Jastrow, a Polish-born American psychologist, was at the time a PhD student at Johns Hopkins University. He would later become a prominent figure of U.S. psychology, and eventually the president of the American Psychological Association (APA) in 1900. He was fascinated by optical illusions and "invented" the famous duck-rabbit picture.

Ian Hacking (1988) praises Peirce's 1885 experimental set-up for its conscious use of randomization – a huge methodological innovation which would not be recognised as such by experimental psychologists for decades, not even by his own co-author Jastrow (Hacking 1988: 433). Randomization is indeed the most striking aspect of a very carefully constructed experimental setting. Moreover, Peirce and Jastrow took great care in reporting experimental results and assessing against their probable error; they even divided the results in four different groups, to normalize the fact that they would get more skilled as the rounds of experiments continued. All this methodological scaffolding aimed at supporting a refutation of the core concept underlying the science of psychophysics: the notion of threshold.

"Threshold" is for psychophysics the point at which a difference in the intensity of stimuli applied to the sensory organs becomes perceivable. The concept of threshold

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<sup>137</sup> The work was presented the 17th of October, 1884.

had a very real, concrete characterization in Fechner's essay, *Elemente der Psychophysik* [Elements of Psychophysics], (1860): chapter 10 of the 1<sup>st</sup> volume of the *Elemente* is titled "Die *Thatsache* der Schwelle" [The *fact* of the threshold, emphasis added], and its conclusion is likewise titled "Folgerungen aus dem *Dasein* der Schwelle" [Consequences from the *existence* of the threshold, emphasis added] (1860:69). The threshold is thus understood as a *fact* of perception, whose *existence* we do not doubt (although we only become aware of it through its effects).<sup>138</sup>

Peirce and Jastrow were challenging, firstly, Fechner's realist understanding of the threshold: for them a threshold could at best be a *practical point of reference*. Secondly, they also objected to the opportunity of introducing such a notion in experimental psychology at all. Fechner thought that the notion of threshold was validated by the three fundamental methods for measuring sensation exposed in his *Elemente*:

- (1) The method of just noticeable differences;
- (2) The method of right and wrong cases;
- (3) The method of the average error.<sup>139</sup>

Fechner decided to illustrate all three methods with examples taken from experimentations with different stimuli of *weight*. Thus, (1) the method of just noticeable differences consisted in experimentally determining the smallest perceivable difference between two weights;<sup>140</sup> (2) the method of right and wrong cases consisted in establishing, given two weights, which was the greater, and in finding the point at which the two were utterly undistinguishable; (3) the method of the average error consisted in trying to

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<sup>138</sup> Fechner (1860, v.1: 69) wrote: "In the third place, it will be necessary to discuss a *fact* (the *fact of the threshold*), which, without being essentially included in Weber's law, is *factually* connected with it" [Drittens wird eine *Thatsache* (*die Thatsache der Schwelle*) [...] zu erörtern sein, welche, ohne im Weber'schen Gesetze wesentlich eingeschlossen zu sein, in *factischem Zusammenhange* damit stehen].

<sup>139</sup> Fechner 1860, I, 71: „Bis jetzt stehen drei Massmethoden der Unterschiedsempfindlichkeit zu Gebote, die ich der Kürze halber als (1) Methode der eben merklichen Unterschiede, (2) Methode der richtigen und falschen Fälle, (3) Methode der mittleren Fehler bezeichne.“

<sup>140</sup> Fechner 1860, v.1: 71: „Die Methode der eben merklichen Unterschiede besteht nun darin, die Grösse des Gewichtsunterschiedes zu bestimmen, welche nöthig ist, um als eben merklich erkannt zu werden.“



approximate a given weight with other weights, so that the two weights would feel equal, and then measure the discrepancy of the second from the first.<sup>141</sup>

Experimenting with weight however posed a number of problems. Fechner's experiment consisted in lifting weights and comparing the resulting sensations. However, lifting weights is an exercise that engages a variety of muscles, so that the resulting sensation is not "localised" in a very definite way; moreover, other factors, such as posture, further complicate the nature of the results. The whole experience is difficult to account for precisely. Fechner was aware of those problems, but believed that accurate planning, discipline, and honest self-observation would overcome them.

Peirce and Jastrow, in their 1885 experiment, decided to investigate the tenability of methods 1-3 (with particular emphasis on method 1) by focusing on the sensation of *pressure*. An illustrious precedent for the use of pressure had been Ernst Heinrich Weber (1795-1878), who elaborated his law by studying pressure stimuli. Weber law states that the ratio of the just observable difference [ $\Delta R$ ] to the initial sensation of weight  $R$  is a constant  $k$ :

$$\Delta R/R = k$$

According to Jastrow, who in 1888 paper provided a "standard exposition" (Hacking 1988, 433) of Peirce and Jastrow's 1885 experiment, "The psycho-physic methods are applicable only to such experiments as can be utilized for establishing Weber's law" (Jastrow 1888: 271): that is, to the notion that just noticeable increments in sensation follow a constant value. They cannot, however, be expanded to account for the relation between sensations and stimuli:

This process simply compares the recognition of a difference in one part of the psychic scale with that in another; it says nothing and cannot be made to say anything about the ratio of stimulus and sensation. It is not a psycho-physic, but a psycho-psychic, law. (Jastrow 1888: 273).

As we will see, part of the reasons for Peirce and Jastrow to reject Fechner's law has to do with a disagreement on what psycho-physical experiments actually measure.

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<sup>141</sup> Fechner 1860, v.1: 72.

Jastrow stood by his and Peirce's argument throughout, quoting it frequently (1888: 280; 285, footnote; 288; 304) and expanding on the key aim of the 1885 paper: the refutation of the idea of threshold. Jastrow's paper is therefore an indispensable resource for situating the 1885 experiment in its scientific and epistemic context, and I return to it in my account of the 1885 experiment wherever necessary.

Peirce and Jastrow's experiment was based on a comparison task between pressure stimuli. The choice to investigate the pressure sensation was consciously made because it allowed to minimize variations between the trials and within the single rounds of experiments. As Hacking (1988) noted, the carefully-constructed set up allowed blinding and randomization to be thoroughly implemented, besides being functional to reduce noise (i.e., sensations coming from different muscles, posture, or general fatigue...). The apparatus consisted of "an adaptation of a *Fairbanks*<sup>142</sup> post-office scale" (W5: 128) to make every transition between one application of pressure and the next one smooth and independent from the experimenter's manual skills. All actions, from applying pressure to the finger to releasing it, through placing an additional weight or removing it, were entirely mechanised, so that the subject would not be distracted or influenced by the experimenters and unconscious cuing could be prevented. All points where the weights would be in contact with the scale plate, or the scale plate with the finger of the subject, were carefully wrapped with flannel, cork, or India rubber, to prevent the feeling of cold (when in contact with a metal surface) or noise (of the weights being lowered on the scale plate) to influence the subject's response (W5: 128).

To control for the set of muscles involved in the experiment, they added a support for the finger, and a somehow modified "filter stand" was used to prevent the finger from moving upwards when pressure was exerted on it (W5: 129). They noted which finger was used for each subject, and that each subject used their dominant hand (left for Peirce, right for Jastrow). A screen ensured that the subject would not see the experimenter:

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<sup>142</sup> Founded in 1830, Fairbanks is still producing scales today (<https://www.fairbanks.com/index.cfm>, last visited on 13/10/19). The Washington Postal Museum holds different models of Fairbanks used to weigh mails; the one Peirce and Jastrow used could have been the four-ounces scale: [https://postalmuseum.si.edu/systems/work/1992\\_2002\\_883.html](https://postalmuseum.si.edu/systems/work/1992_2002_883.html), last visited on 13/10/19.

a screen served to prevent the subject from having any indications whatever of the movements of the operator. It is hardly necessary to say that *we were fully on our guard against unconsciously received indications*. (W5: 129; emphasis added).

The appreciation of the risk posed to the purpose of the experiment by possible unconscious communication between subject and “operator” is a consequence of Peirce’s interest in the methods for the study of psychical phenomena, which were at the time at the centre of much scientific debate (see Ch. 5 for an account of this context). The Society of Psychical Research had been founded in London in 1882, and much of its early work was focused on separating “real” psychical phenomena from fraud. The idea that information exhibited by mediums in their *séances* was actually been unconsciously communicated by participants themselves was one of the hypotheses on the table to explain telepathic phenomena. Peirce, as we will see, was inclined to support this hypothesis. In the MS “Design and Chance” (1883/4), he stated:

For my part, I cannot withhold my approval of the proceedings of the society for the prosecution of psychical research, which is engaged in the careful examination of all kinds of phenomena which suggest the possibility of the relation between body and soul being different from what ordinary experience leads us to conceive it. (W4: 544).

“Careful examination” is just the opposite of “blind acceptance”: for Peirce, the matter deserved to be examined with all the precautions that a well-planned scientific experiment could assure. Thus, in the case of his experiment with Jastrow, all precaution was taken to rule out the possibility of unconscious cuing.

Peirce and Jastrow’s care in designing the experiment is even more striking when compared with Weber and Fechner’s. Taking just the case of Fechner, his *Elemente* contains a wealth of description and discussion of experimental set-ups, so as to make the book one of the richest source on experimental design before Fisher’s 1935 *The Design of Experiments* (Stiegler 1986: 244). However, the problems with Fechner’s methodology were not small. For one, (1) Fechner’s experiments were not blinded: Fechner was both the subject and the observer of his experiments and he knew in advance which weight was actually the heaviest. Secondly (2), the exercise of weightlifting alone introduced an array of possible distortions which were impossible to take into account according to Peirce

and Jastrow's standards. Moreover, from the point of view of the analysis of result, (3) Fechner decided to allow undecided judgements, and to divide them equally in right and wrong cases.

This last practice (3) was subjected to much criticism already in Fechner's lifetime (Stiegler 1986: 253), and among the critical voices there was Jastrow's (1888).<sup>143</sup> Peirce and Jastrow (1885) do not attack it directly, however in their experiment they found a cunning way to overcome the problem of undecided judgements.

The subject had three different weigh pressures on his finger; the first and the third were the same, and the second one could be either a heavier or a lighter weight. The subject was forced to answer the question, "which is which?", which is the greater of the two pressures (the one occurring in trial 1 and 3 or the pressure in trial 2)?

Before proceeding with the answer, however, the subject had to state their degree of confidence according to a scale:

0 denoted absence of any preference for one answer over its opposite, so that it seemed nonsensical to answer at all. 1 denoted a distinct leaning to one alternative. 2 denoted some little confidence of being right. 3 denoted as strong a confidence as one would have about such sensations (W 5: 125).<sup>144</sup>

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<sup>143</sup> Jastrow 1888: 283: "But may we not, as Fechner and many others did, count half of the doubtful answers right and half wrong? Certainly not. (1) Because all judgments must be recorded as given; (2) because that would give a fictitious appearance of having made more observations than you really have, and when  $x$  is small (and the number of doubtful answers large) would seriously influence the meaning of the result; (3) because, while it is true that the chance of any answer in general being correct is one half, it is not at all likely that the chance of this particular kind of an answer being correct is as much as one half."

<sup>144</sup> See also Peirce's formulation of ca.1907, CP 7.44: "The subject having observed the three states of feeling of pressure (of which the first and last were equal), first pronounced one or another of the four numerals, Naught, One, Two, Three. "Three" would mean that he was sure, or almost sure, of being able to say whether the middle pressure was greater or less than the other two. "Two" would mean that he was by no means sure, yet inclined to think he could tell. "One" would mean that he did not think he really perceived any difference; yet suspected that he perhaps might. "Naught" would mean that he was sure he could not perceive the slightest variation of pressure. Having thus indicated the degree of his confidence, he was obliged to say whether the middle pressure was greater or less than the others. *In case his confidence was zero, this*

The confidence scale has a crucial role in their argument against the notion of threshold. If, as Fechner maintained, there was a real threshold in sensation, then all stimuli falling below the threshold (i.e., scoring 0 on the confidence scale) would be having equal probability to be right or wrong, in the long run (W5: 123). Fechner, in an experiment on the perception of combined shadows quoted at the beginning of Peirce and Jastrow's paper, indeed stated that a stimulus falling below threshold would become utterly imperceptible:

when the difference in illumination between a shadow and the surrounding room falls below a certain limit, such difference completely [total] disappears for the sensibility and therefore can no longer be perceived. (Fechner 1860, v.2: 243).<sup>145</sup>

In this passage, the threshold has the effect of creating a clear-cut discontinuity between what is apparent to sensation and what is not. This does not represent fairly Fechner's thought, since he also maintained that one could have a scale of "negative sensations," i.e. sensations below threshold. For Peirce and Jastrow however, it is important to hold on to the idea of threshold as a clear-cut distinction in sensation in order to show that, if this is not the case, then the notion of threshold has to be abandoned. As Jastrow would state more extensively:

Either there is a threshold - be it a point or a more or less variable line - below which is homogeneous unconsciousness; or from the region in which the *sensed* difference has its maximum of clearness down to the point where it utterly vanishes because the difference between the stimuli vanishes, there is a continuous series of intermediate degrees of clearness, and there is no point

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*declaration would be (to his own consciousness) a purely random one [...]. Of course he never received the slightest intimation of whether he was right or wrong."* Emphasis added.

<sup>145</sup> Fechner 1860, v.2, 243: „wenn der Unterschied zwischen der Erleuchtung des einen Schattens und des umgebenden Raumes unter eine gewisse Gränze geht, verschwindet der Unterschied *total* für die Empfindung und vermag durchaus nicht mehr wahrgenommen zu werden.“ Emphasis added.

on the curve with characteristics peculiar to itself, no threshold in any true sense. (Jastrow 1888: 277. Emphasis of the text).

According to Peirce and Jastrow's results, what was the case was the existence of "a continuous series of intermediate degrees of clearness": this series would be visualised as a curve, which would map the distribution of possible error according to the value of the differential stimulus. Thus:

If there be a least perceptible difference, then when two excitations differing by less than this are presented to us, and we are asked to judge which is the greater, we ought to answer wrong as often as right in the long run. Whereas, if the theory of least squares is correct, we not only ought to answer right oftener than wrong, but we ought to do so in a predictable ratio of cases. (W5: 123).

It might be noted that Peirce and Jastrow are being realist about the method of least squares just as much as Fechner was about the notion of threshold. From their opposite perspective, they still agree in finding in the method for measuring the relation between stimuli and sensation an indication of how, *in reality*, sensation is produced. For both, the "law" of perception has a cosmological, not just epistemic, import. Peirce defines the probability curve as "the law of an effect brought about by the sum of an infinite number of infinitesimal causes" (W 5: 123): it is not just a method to evaluate the likeliness of a result, but it tells us something about how this result is actually produced.

Going back to the experiment, Peirce and Jastrow took care to report in detail how the experiment was organised. Here is where Peirce's mathematical cunningness shows. Each round incorporated three pressure stimuli. The first and the third stimuli corresponded to the same weight, while the second could be either lighter or heavier according to a certain ratio. Jastrow and Peirce were in turn subjects and observers of their experiments, and they were the only subjects on which the experiment was performed. It took about 5 months of trials, and, in order to take into account the pair's

growing expertise and the various adjustments that they were able to introduce as time went on, the trials were grouped into 4 sets,<sup>146</sup> and results were compared accordingly.

To inhibit any guessing on the subject's part of which weight would come next, the observer was forced by a pack of 25 cards to follow a random order in the sequence of rounds that composed each experimental session. "In this way 150 experiments on each of us were taken at one sitting of two hours" (W 5: 130). Blinding and randomization were both excellent methodological innovations especially in a context where little was known: "The more 'empirical' and non-theoretical a question, the more randomization makes sense" (Hacking 1988: 434). However, as we have seen, the question they asked was not just "empirical." Together with a new methodology for psycho-physical research, Peirce also aimed to take a position within the telepathy debate and to suggest that the idea of a *continuous, if partially unconscious* perception was better suited to the scientific investigation of telepathic phenomena than Fechner's "law" of a threshold in perception. Thus, for Peirce the result of the 1885 experiment has important research implications:

The general fact has highly important practical bearings, since it gives new reason for believing that we gather what is passing in one another's minds in large measure from sensations so faint that we are not fairly aware of having them, and can give no account of how we reach our conclusions about such matters. The insight of females as well as certain "telepathic" phenomena may be explained in this way. Such faint sensations ought to be fully studied by the psychologist and assiduously cultivated by every man. (W5: 135; emphasis added).

Peirce was proposing, together with a remarkable improvement of the experimental methods of psycho-physics, a scientific hypothesis for empathy as well as for the more controversial phenomenon of telepathy. Indeed, Peirce's strategy for explaining telepathy seems a proposal to reduce it to a kind of empathy on a larger scale. I develop Peirce's position on the scientific investigation of telepathic phenomena in detail in the next chapter (Ch. 5). In the next section, I elaborate on the relation that this conclusion has with Peirce's 1880s philosophy of science.

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<sup>146</sup> See W5: 132: "The first will include the experiments from December 10 to January 22, inclusive; the second from January 24 to February 24, inclusive; the third from March 4 to March 25, inclusive; the fourth from March 30 to the end of the work."

### 4.3 Experimental Psychology and the Method of Science

The simultaneous issue of the *Photometric Researches* and the *Illustrations* (1878) testifies for the fact that Peirce's research in methodology and logic of science was parallel to his career as an experimental scientist – or, to use Peirce's expression, as a “scientific specialist” (W4: 380). As noted in sec. 4.1, Peirce's involvement in scientific fieldwork even predated his 1865 *Harvard Lectures*. Throughout his career, the concerns of an experimental scientist shaped his philosophical reflections, while his philosophical sensibility allowed him to project the results of scientific experiments onto a broader metaphysical picture. The continuous back and forth between experimental science and philosophy are part of what makes Peirce's writings “obscure” and at the same time incredibly rich for the contemporary historian and philosopher of science.

In this section, I look at Peirce's method of science in the Johns Hopkins circular of 1882, the “Introductory Lecture on the Study of Logic,” which summarizes Peirce's development from the *Illustrations* of 1877-8 (described in Ch. 2) to the “methodological crossover” and the fallibilism of his later years. Peirce again started by articulating the purpose of logic in scientific inquiry. Firstly, Peirce stressed (as he had done in the *Fixation* paper, W3: 243-4)<sup>147</sup> that logic must be a practical affair, where “practical” clearly has the meaning of “experimental”:

[Logic] is the *art of devising methods of research*, – the *method of methods* [...]. Logic will not undertake to inform you what kind of experiments you ought to make in order best to determine the acceleration of gravity, or the value of the Ohm; but it will tell you how to proceed to form a plan of experimentation. (W4: 378; emphasis of the text).

Logic is thus a tool to evaluate and develop experiments in science, which for Peirce are the very processes through which science is carried on. Devising methods of research is an art which can be studied from multiple perspectives. One is the imagination of the experiment and the construction of the setting. The other is the evaluation of its

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<sup>147</sup> “[Lavoisier] was to carry his mind into his laboratory, and to make of his alembics and cucurbits instruments of thought, giving a *new conception of reasoning*, as something which was to be done with one's eyes open, *by manipulating real things instead of words and fancies.*” W3: 243-4; emphasis added.



results, i.e. an assessment of the possible error involved, which indicates the reliability of the results themselves. Obviously, the two aspects are not separate, since minimisation of possible errors is the guiding idea informing the construction of the setting as well as the evaluation of the results. The first one – the imagination of the experiment and the construction of the setting – is potentially cared for by the methodological crossover, while the second one would need the introduction of a new concept: that of *chance*.

In order to “form a plan of experimentation” (W4: 378), the successful scientist should have an understanding of different special sciences and of their methods, since the application of an already well-established method to a different problem or a different field of inquiry is what chiefly constituted “the progress of the passing generation” (W4: 380). Peirce gave a list of historical examples to support his normative claim:

Darwin adapted to biology the methods of Malthus and the economists; Maxwell adapted to the theory of gases the methods of the doctrine of chances, and to electricity the methods of hydrodynamics. Wundt adapts to psychology the methods of physiology; Galton adapts to the same study the methods of the theory of errors; Morgan adapted to history a method from biology; Cournot adapted to political economy the calculus of variations. (W4: 380).

All the actors listed by Peirce were consciously utilizing methods from different disciplines to investigate new problems. For instance, Galton believed that composite photographs could be used to investigate the same mental processes that they allegedly imitate, namely the creation of “generic images” or general ideas (Galton, 1879: 166);<sup>148</sup> Whewell proposed to adopt the “continued and connected system of observations and calculations” typical of astronomy to “improving our knowledge of other subjects; as Tides, Currents, Winds, Clouds, Rain, Terrestrial Magnetism, Aurora Borealis, composition of crystals, and the like” (Whewell 1858a: xi).<sup>149</sup>

Peirce’s *Lecture* is an invitation to logic, but it is also a warning against the risks for the individual of a very specialised career, which remains blind to the bigger picture

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<sup>148</sup> On Galton, generic images, and its relation with Peirce’s philosophy see Ambrosio (2016) and Hookway (2002).

<sup>149</sup> On Whewell and the adoption of methods from astronomy to the study of tides see Cristalli & Dorado, *forthcominig*.

of science. Confining one's intellectual abilities to a very specialist work, if useful for the progress of science more broadly, is not going to help the practitioner flourish, neither from a human nor from the perspective of a career in the sciences:

...in my judgment there are scientific men, all whose training has only served to belittle them [...]. I am quite sure that a young man who spends his time exclusively in the laboratory of physics or chemistry or biology, is in danger of profiting but little more from his work than if he were an apprentice in a machine shop. [...] But the higher places in science in the coming years are for those who succeed in adapting the methods of one science to the investigation of another. (W4: 380).

According to Peirce, there are two elements which constitute an indispensable background to occupy the "higher places in science": (1) proficiency and first-hand experience in at least a branch of the experimental sciences, since "logic can never be learned from logic-books or logic lectures. The material of positive science must form its basis and its vehicle" (W4: 381); and (2) a knowledge of logic, which is knowledge of the principles upon which any particular method depends.

It seems that the pedagogy advocated by Peirce is somehow circular: one has to derive one's logic from the practice of science, and any serious experimental practice will necessarily be situated in one particular discipline; however, knowledge of logic is knowledge of general principles, and only as such it can lead the scientist out of the "machine shop" of narrow laboratory work. To avoid this circularity, the logic of experimental science has to be unpacked and its elements examined. Peirce used history to bridge the gap between formal logic and necessarily narrow scientific practice. By doing this, he was following the footsteps of William Whewell (as seen in 1.2).

In the *Lecture*, Peirce planned to illustrate the theory of scientific reasoning logically analysed in the first part of the course via a notable case study, i.e. Kepler's treatise:

Finally, it is desirable to illustrate a long concatenation of scientific inferences. For this purpose we take up Kepler's great work, *De Motibus Stellae Martis*, the greatest piece of inductive reasoning ever produced. Owing to the admirable and exceptional manner in which the work is written, it is possible to follow Kepler's whole course of investigation from beginning

to end, and to show the application of all the maxims of induction already laid down. (W4: 382).

The quote illustrates the pivotal role that Peirce assigned to the history of science in the formation of every scientist. The structure of scientific discovery, embedded in the details of day-to-day experimental practice, becomes apparent in the history of science, which seems to allow the right distance – neither too close, nor too far – to study and understand the logic of scientific reasoning. Moreover, Peirce’s project of including an analysis of Kepler’s treatise in his 1882 course reinforces the claim that the logic of scientific reasoning is for Peirce an experimental logic of discovery, to which the combination of induction and hypothesis is essential.

Kepler was to become a classical example for Peirce to illustrate the benefits that logic brings to scientific discovery as well as a training ground to learn to reason logically about scientific questions. In his c.1896 manuscript “Lessons of the History of Science,” Peirce introduced the term “retroduction” to designate the “long concatenation of scientific inferences” of the 1882 lecture.<sup>150</sup> “Retroduction,” a term which paved the way to the better-known “abduction,” was also defined by Peirce as one and the same with *experiment*:

As for retroduction, it is itself an experiment. A retroductive research is an experimental research; and when we look upon Induction and Deduction from the point of view of Experiment and Observation, we are merely tracing in those types of reasoning their affinity to Retroduction. (Peirce 1898; RLT: 170).

While this quote goes beyond the timeframe of this chapter, it contributes to the present discussion in adding hindsight on the connection between logic of science, experimental practice, and the history of science. The point of view of experiment and observation were also the focus of the 1882 lecture, and Peirce’s claims, as seen, rested on a thorough experience in scientific research.

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<sup>150</sup> Peirce (c.1896), CP 1.74: “Kepler shows his keen logical sense in detailing the whole process by which he finally arrived at the true orbit. This is the greatest piece of Retroductive reasoning ever performed.”

Moving to a metaphysical level, Peirce's experimental practice with measurement and errors resulted in the rejection of any absolute axiom and fixed law. Peirce used the concept of chance to challenge the Newtonian world-picture based on the absolute determinism of the laws of nature. This metaphysical commitment was indeed in the background of Peirce's inferentialist epistemology since the 1868 "cognition" papers. There, the idea that knowledge could not rest on anything "absolute" was used to reject immediate perception and a foundationalist account of the self.<sup>151</sup> The study of errors of observation – pursued since 1873 – and the constant scientific practice with measurements made Peirce reject the notion of natural laws as absolutely necessary. This rejection included the laws of physics and psycho-physical laws such as the threshold of perception. Peirce's anti-determinism appears fully situated in the context of his experimental work, both in the physical and in the psychical sciences. Hacking (1988: 432) already noted how "Peirce was a long-time student of errors of observation in geodesy and astronomy and had refined the theory of error to describe experimental phenomena in those domains." Indeed – Hacking goes on – Peirce was also the first to apply the theory of errors to observations in psychophysics.

In a fragmentary MS titled "Design and Chance" (Dec. 1883/Jan. 1884), Peirce wrote that beyond Darwinism, another fundamental trend of scientific research in all areas has been a "tendency to question the *exact truth* of axioms" (W4: 544). First to be called into question are the "axioms of geometry," which were proved to be "*mere empirical laws* whose perfect exactitude we have no reason whatever to feel confident of" (W4: 544-5).<sup>152</sup> In this context, challenging the notion of threshold of perception, which could be seen as the first and foremost "axiom" supporting the formulation of psycho-physics' laws, is a move that Peirce may have consciously undertaken in response to what he perceived to be a general trend of his time.

Peirce gave a more detailed account of his metaphysical integration of chance, evolution, and mental development in the so-called "*Monist Metaphysical Series*" – a

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<sup>151</sup> As illustrated in Ch. 2.

<sup>152</sup> Peirce does not reference the authors of the "proof" of the empirical nature of the axioms of geometry. Of note, Bernhard Riemann's inaugural lecture (posthumously published by Dedekind) reads: "Ueber die Hypothesen, welche der Geometrie zu Grunde liegen" [On the Hypotheses which lie at the Bases of Geometry] (1867). The idea of an empirical nature of the axioms of geometry is also a consequence of Helmholtz's physiology (see Ch. 3).

series of five papers appeared on the *Monist* in the years 1891-3, to which I return in the next chapter (Ch. 5). The 1883/4 “Design and Chance” is the first instance where Peirce strives to make his metaphysics explicit. Its reading in light of the rejection of the “axiom of psychophysics” contributes to showing the deep connection between metaphysical reflection and scientific practice, and to what would it have meant for Peirce to apply the law of chance to the phenomena of the mind. Moreover, as stated in the “Design and Chance” manuscript, the rejection of axioms is a rejection of their “exact truth” or outer reality.

In contrast, “chance” was for Peirce a real force in the universe. Chance emerges out of the recognition that (1) no axiom is exactly true and (2) no axiom is in fact a priori, but they are all (including the axioms of geometry) the result of empirical laws gradually *evolved* to the present-day stability (W4: 544-5). Apart from the evolutionary side, the idea that the axioms of geometry are an a posteriori construction from experience is very much reminiscent of Helmholtz’s empirical and inferential account of space and time (see Ch. 3). The extent to which chance is naturalised as one force among other physical forces can be appreciated from this passage:

It has always seemed to me singular that when we put the question to an evolutionist, Spencerian, Darwinian, or whatever school he may belong to, what are the agencies which have brought about evolution, he mentions various determinate facts and laws, but among the agencies at work he never once mentions Chance. Yet it appears to me that chance is the one essential agency upon which the whole process depends. (W4: 548).

Not only chance is a natural force, but it is also the force thanks to which the process of evolution can be, in some respects, explained. Now, what is the connection between chance, evolution, and perception? If perception is made the result of evolution, and chance is “one essential agency” of the evolutionary process, then it is only fitting that perception be understood as the probability, given a certain differential sensation, to judge correctly about it. Importantly, for Peirce those processes are *real*, and their pervasiveness guarantees the unity between the world of the mind and the world of physical facts:

I have several times shown to my classes how some of the main laws of cerebration and particularly the formation of habits could be accounted for by

the principles of probability, and I have shown by experiment how a certain regularity of arrangement can be impressed upon a pack of cards by imitating the action of habit. (W4: 553).

If the laws of mental evolution follow, to a certain extent, the law of chance, which is also informing the evolution of the material world, then notions developed to analyse the physical world, such as the “principles of probability,” may account for the processes of the mind. Thus, the difference between a physical law and a psychophysical law becomes a difference of degree rather than of kind. As Nordmann (2006) notes, to substitute Fechner’s law with the method of least squares means to argue that a method developed to minimize the errors in judging about observations in astronomy is *better suited* to the representation of the process of perception than the psycho-physical principle proposed by Fechner:

If there is continuity between conscious and unconscious judgment that follows the curve of error, then it is the curve of error (rather than sense-physiology) that measures sensibility in the first place. (Nordmann 2006: 274, note 26).

The curve of error, developed to assess the reliability of observations in astronomy, is not a neutral tool. Instead, it incorporates and justifies, for the nineteenth century scientist, the idea that there is an element of *judgement* incorporated in perception. The astronomer’s observation is not treated as an immediate perception, but as a judgement subject to error; the law of errors is introduced to take the fallibility of judgement into account. It is not a case that Helmholtz, when illustrating the idea of unconscious judgement in perception, draws an analogy between the perceiving subject and an astronomer (Helmholtz 1867: 430; see Ch. 3).

One could ask, finally, what the theory of cognition has to do anyway with a study of the logic of science. Would it not, again, bring Peirce back to psychologistic allegation? Indeed, it may, if “psychologism” is understood as allowing any reference to cognition and scientific practice to influence our thinking about the logic of science. As I showed in Ch. 2, this was not the kind of psychologism that Peirce was fighting against, because for him neither cognition nor scientific practice are purely personal and arbitrary processes. In fact, in his *Introductory Lecture to the Study of Logic*, Peirce declared:

The course which I am to give this year begins with some necessary preliminaries upon the theory of cognition. For it is requisite to form a clear idea at the outset of what knowledge consists of, and to consider a little what are the operations of the mind by which it is produced. (W4: 381).

While Peirce advocated a certain amount of psychological knowledge as a preliminary step in the study of logic, this was not to be understood as a kind of (belated) return to psychologism. Instead, Peirce gave to his logic students some notions of the “operations of the mind,” i.e. of the inferential structure with which the mind, according to Peirce, operates. These operations were scientifically supported by experiments, whose methods and instruments had a lot in common with astronomy (as seen in the previous sections). The application of those methods to the study of perception inevitably influenced the object of psycho-physical research, i.e. which aspects of the process of perception are investigated.

My suggestion is that Peirce’s scientific psychology, connected with his epistemology and metaphysics, also created an object of its own. In some sense, it is *a psychology of the interpersonal space*, describing phenomena in a continuous fashion across individualities (Fabbrichesi 2015: 42-44; de Tienne 2005: 28-38). Peirce’s most suggestive illustration of what I call a “psychology of the interpersonal space” is the metaphor between the self and a cluster of stars, firstly published by de Tienne in 2005:

...personality, on both sides, that of the unification of all of a body’s experience, and that of the isolation of different persons, is much exaggerated in our natural ways of thinking, ways that tend to pull up the person, and make him think himself far more real than he veritably is. *A person is, in truth, like a cluster of stars, which appears to be one star when viewed with the naked eye, but which scanned with the telescope of scientific psychology is found on the one hand, to be multiple in itself, on the other hand, to have no absolute demarcation form a neighbouring condensation.* (Peirce, R 403: 1-2. Emphasis added).

There is more to this metaphor than a poetic suggestion. The “telescope of scientific psychology” refers to the method of experimental psychology and to its similarity (when not direct borrowings) to astronomical observations. Thanks to experimental psychology, the naïve impression of a solid, unitary self is dissolved. Not

only there is not an immediate and originary sense of self on which all our impressions can be grounded, as Peirce argued in the 1868 “cognition” essays, but also that unity that is the careful product of countless testimonies and contributions from others appears as unbounded and therefore fundamentally continuous with other selves. The metaphor also suggests that there is much more within and between different individuals than what appears to observation with the “naked” eye. Moreover, the partial overlapping between a cluster of stars and the next one closely reminds of the “sensations so faint” that Peirce, in the conclusion of his paper 1885, suggested as possibly responsible for emphatic understanding or cases of telepathic communication (W5: 135). In a modern language, these faint sensations could be seen as enabling “mind-reading” abilities, with the difference that, in Peirce’s metaphysics, there is no insurmountable barrier between minds.

Peirce’s metaphor of the self as something to be looked at through telescope’s lenses is reminiscent of a metaphor situated at the beginning of Kant’s psychology lectures (1821)<sup>153</sup> and in the *Anthropology from a Pragmatic Point of View* (1798). The *Anthropology* had been Kant’s most popular course and had the purpose to study humans not from the perspective of how nature had made them (i.e. psychology) but from the perspective of their own free self-determination (AA IV: 118). In both passages, Kant used the case of the telescope to argue for the presence in the soul of a quantity of impressions, which are nonetheless too faint to be noticed by the consciousness. In the second passage Kant also introduced the microscope in the metaphor, thus creating a

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<sup>153</sup> Those lectures are today contained in the section on psychology (empirical and rational) of *Metaphysik L<sub>I</sub>*: 221-301, in AA, IV section (*Vorlesungen*). See Gian Antonio de Toni, *Nota al Testa* of the Italian edition of the lectures (de Toni 1986/2004: 31). The text appeared in 1821 as part of the *Vorlesungen über der Metaphysik* [Lectures on Metaphysics] edited by Ludwig Pöhlitz (1772-1838), a collection of manuscript notes from Kant’s lectures coming from different hands and different times. The text was very influential upon Eduard von Hartmann (1842-1906), the metaphysician of the unconscious (de Toni 1986/2004: 35; Gardner 2010). Moreover, in 1889 the lectures on psychology were republished in separate volume by Carl du Prel (1839-1899), a spiritualist who interpreted Kant’s philosophy as a mystical *Weltanschauung*. The community of Kant scholars replied to du Prel’s reading with silence (de Toni 1986/2004: 40-1); however, as Thomas P. Weber (2007: 594) explains, “nineteenth-century spiritism takes a far more central position in the cultural landscape of its time than most other earlier and later esoteric movements.”



bridge between the analysis of perception in analogy with astronomical observation seen in this chapter and the discussions on the nature of the psyche at the unicellular level that I illustrate in the next chapter: “All object that the eye discovers while armed with a telescope (i.e. something by the Moon) or with a microscope (i.e. the little animals *infusoria*) – is also seen by the naked eye.”<sup>154</sup>

All those objects – too far, or too small – were seen, but unconsciously. They could not be brought to consciousness without the use of an instrument; however, the very fact that a magnifier was enough to make us aware of them meant (for Kant) that they were always part of our perception. Kant explicitly followed Leibniz in naming those impressions “obscure.” Peirce’s contribution to this long heritage of philosophical discussions around unconscious sensations is to turn the telescope back onto the observer, and to make the subject an object of investigation. The inferential notion of perception, examined in Ch.s 2 and 3, structured an essentially fallible self, who, in spite of being “in the main logical,” it is “not perfectly so” (W3: 244). The inferential theory of perception combined with the rejection of the threshold made it possible for Peirce to imagine a self which is always the result of an underlying inference, without a definite beginning and possibly without a definite end.<sup>155</sup>

## Conclusion

This chapter focused on the relation between Peirce’s experimental psychology, astronomical observations, and the developments of his logic of science. In the first section I illustrated the close correspondence, both on a chronological and on a thematic ground, of photometry, original experiments on colour perception, and the application of a law of psychophysics to the evaluation of observations in astronomy. While contributing to a nuanced understanding of Peirce as an experimentalist, this section also provides a case study in the broader debate in history of science on the relations between psychology and astronomy in the nineteenth century. What appears from my case study is that the influence between the two disciplines was mutual, with experimental

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<sup>154</sup> „Alles, was das bewaffnete Auge durchs Teleskop (etwa am Monde) oder durchs Mikroskop (an Infusionsthierchen) entdeckt, wird durch unsere bloßen Augen gesehen“ (AA VI: 135). Translation mine.

<sup>155</sup> On the question of the end of the self, see Peirce’s concerns with psychical research in Ch. 5.

psychology contributing to assess observations in astronomy and astronomy furnishing instruments that could be adapted to measure human perception.

In the analysis of Peirce and Jastrow's 1885 experiment "On Small Differences of Sensation," generally acknowledged for its methodological innovations, I focused on its connections with the philosophical and epistemological project of Peirce, and especially on highlighting the relation between his rejection of the notion of threshold in perception and his commitment to inferentialism.

Lastly, I focused on a key methodological text from 1882 to illustrate Peirce's attitude to the logic of science in the very years when he was involved with experimental psychology. Peirce's approach is in line with his time in seeing in a "methodological crossover" the way for fostering the development of science; Peirce however, uniquely from his contemporaries, aimed at finding a logic that would guide the scientist in this operation, and to keep the history of science as a lesson in scientific reasoning. In the same years, Peirce introduced the notion of chance into his metaphysical world view. I illustrate the connection of the metaphysical notion of chance with Peirce's experimental practice and especially how the rejection of absolute laws and axioms may have come from his experience as an experimentalist on the one hand, and from the influence of Helmholtz's empiricism on the other hand.

The metaphor of the self as a cluster of stars, without borders separating it from other clusters, and with a number of stars too huge to be counted, is also interpreted as an outcome of the inferentialist approach to knowledge on the one hand, and the new, fallibilist metaphysics on the other. The continuous self and its faint sensations are under focus of discussion again – together with the notion of chance at a metaphysical level – in the next chapter (Ch. 5), where Peirce's theory of inquiry will have to engage with psychical research.

# Chapter 5. Spiritualism, Protoplasm, and the Boundaries of Common-Sense Science

## Introduction

Just one year after Peirce and Jastrow's paper "On Small Differences of Sensation" and the related, implicit controversy with Fechner over the methods and meaning of psychophysics' law (examined in Chapter 4), the world of psychological research witnessed the appearance of a colossal publication: Gurney, Myers, and Podmore's *Phantasms of the Living* (1886). The work collected "experiments" and "spontaneous" cases of communication from one mind to another mind by methods others than those of ordinary perception, meticulously fact checked. It immediately became a milestone in psychical research, understood as the scientific investigation of paranormal phenomena.

Another year passed and Alfred Binet (1858-1911), now best remembered for having formulated a widely adopted IQ test, published a paper titled "La Vie Psychique des Micro-organismes" [*The Psychical Life of Micro-Organisms*], where he defended the idea that "protoplasm," i.e. what is now known as cytoplasm,<sup>156</sup> had a psychical life of its own and was capable of insight and feelings (although very simple ones). Binet's paper exemplifies another strand of psychological research in the second half of the nineteenth

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<sup>156</sup> "Cytoplasm" literally refers to the plasmatic substance inside the cell's membrane; etymologically, it comes from the Greek κύτος, meaning "the hollow of a body (generally a shield, a vase or a basket)" and πλάσμα, meaning "anything formed, moulded." The term "protoplasm" was coined by Jan Evangelista Purkyně in 1840 (Wayne 2009: 151) and the meaning of the two terms initially overlapped, although "protoplasm" was more general in that it did not imply the existence of the cellular membrane nor that the cellular membrane was essential for the definition of the cell (two hotly debated topics at the time).

century, which was known then as “general psychology” or “physiological psychology” and is considered today more as part of the history of neurophysiology than as integral to the history of psychology.<sup>157</sup>

Peirce’s philosophical and metaphysical work in the years 1886-1893 is an original take on both spiritualism and physiological psychology. The discussion of spiritualism exhibits what may sound like the very contemporary concerns of “boundary work,” i.e. the work towards the definition of a field and of who is authorised to contribute to it, a work which has as its foil the discussion of what does *not* count as knowledge in the given domain and of who is excluded from its production (Gieryn 1983). In sec. 5.1, I illustrate Peirce’s reaction to Gurney et al.’s book and counter it with James’. The debate on psychical research sheds light on the role that “moral” values, such as that of integrity and perseverance, play in attributing epistemic values, such as precision and thoroughness, to the scientists. The intermingling of moral and epistemic values has long been highlighted by historians and sociologists of sciences, although with very different conclusions for the status of scientific knowledge overall (Fleck 1935; Merton 1938; Shapin 1988; Daston 1995). Indeed, as Daston and Galison (2007) illustrate, the separation between moral and epistemic domains depends on a specific construction of the notion of objectivity. In the nineteenth century, the intermingling of moral and epistemic concerns is not a product of epistemic naiveté among nineteenth century researchers but rather expression of a notion of objectivity in which the inquirer’s integrity still plays a central role.

Indeed, not all scientific inquiries in the nineteenth century made the moral characters of the scientists such a crucial point for the evaluation of evidence. Lorraine Daston (1995: 14-16) illustrates the connection between investigating of “strange phenomena” and emphasising the moral qualities of the scientist in sixteenth- and seventeenth-century science; in the nineteenth-century, psychical researchers who wanted

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<sup>157</sup> An important exception to this is constituted by the work of historians of psychoanalysis, as noticed by Schloegel and Schmidgen (2002: 643-4). Freud was deeply influenced by physiological psychology and continuously stressed the importance “of a focus on the organic individual for a sound biological foundation of psychology” (id.: 644). More precisely, “Beginning in the mid 1910s, he [Freud] employed microorganisms as models for explaining the structure and function of the psyche and its interaction with the environment. [...] in 1923, he repeatedly described the ego as a protozoan” (id.: 644).

to bring their unorthodox observations to the attention of the scientific community also had to defend a reputation of irreprehensible scientists in order to get audition by the rest of the scientific community. Questions such as the reliability of direct witnesses and the moral status of the observers formed part and parcel of the evaluation of psychical phenomena themselves. As Daston notes, if “strange phenomena” were “the archetypes of the first scientific facts,” “these early facts resemble those honored by later generations only in part” (Daston 1995: 16). The negotiation for psychic phenomena’s place among scientific facts interrogates the role that the unusual and the strange should have in science according to Peirce and James.

Sec. 5.2 focuses on Peirce’s argument for common-sense and its epistemic value in science. Peirce’s strategy in response to the case of spiritualism is to make it possible for psychic facts to become scientific facts, in so far as they can gradually be integrated into common sense. Peirce’s belief is that common sense is not given once and for all, yet even while being itself the result of a historical and evolutionary process, it is generally more trustworthy than any idiosyncratic fact because it was practically confirmed by generations of observers in countless different situations.

Finally, sec. 5.3 explores Peirce’s position in relation to protoplasm research. Peirce wanted to maintain the “common-sensical” opinion that all animals, even the simplest cells, are not reducible to purely mechanical processes; at the same time, he strived to reconcile a chemical and a psychical account of protoplasm’s behaviour. Peirce’s take on protoplasm allows him to further develop his position on telepathic communication and spiritualist experiences, with an attempt to bring all extraordinary experiences within the domain of common-sense.

## 5.1 Telepathy, spiritualism, and their impact on science

As seen in Ch. 3, one of the pressing concerns of Kant and post-Kantian natural philosophers was the possibility of psychology as a science. Such concerns not only tell us about the perceived status of psychology, but also convey insight into the accepted norms that define and delimitate knowledge as “scientific.” Besides those theoretical concerns, the question of the object and method of psychological inquiry was shaped also by a debate which captured public attention in the second half of the nineteenth century: the debate over telepathy, ghosts, and the scientific viability of a study of those phenomena. Thought transference, mind-reading, communication with the dead, and

other practices that defied a common-sense understanding of natural phenomena were grouped together under the label of “psychical” but were not necessarily condemned in their own time. Indeed, as recent historiographical work has shown (Sommer 2013; Schloegel and Schmidgen 2002: 614-5), the cleavage between psychical and experimental psychology was mostly created by a positivist historiography, anxious to show the development of psychology as a linear progress from philosophy to science (a case in point being Boring 1942). The debate between experimental psychologists, psychical researchers and natural scientists further illustrates the code of practice with which psychical researchers complied in order to maintain respectability and to make their subject-matter, in turn, a respectable object of inquiry. As Alex Owen notes, “Indeed, although psychical research was in part directed against Victorian scientism and ‘the cult of positivism,’ most active psychical researches favoured the interpretive framework of scientific naturalism and adhered to the empirical method as the only legitimate means by which to proceed in their investigations” (Owen 2004: 142). Thus, psychical research has to be understood as markedly different, in its aims and especially in its methods, from occultism and theosophical cults, which became extremely popular ways of understanding and practicing supernatural phenomena. “For all their sympathy with a non-reductionist account of mental processes, and however close psychology might have been to the occult in its concerns, psychologists and psychical researchers parted company with occultism when it came to epistemology and method” (Owen 2004: 142).<sup>158</sup>

In this chapter, I concentrate my attention on the debates around the Society for Psychical Research (SPR), founded in London in 1882, and its North American sister, the American Society for Psychical Research (ASPR), founded in 1885. Both societies are still active today.<sup>159</sup> William James was correspondent member of the SPR and co-

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<sup>158</sup> This does not mean to interpret the “occultist” approach to supernatural phenomena as simply irrational: occultists claim to have access to domains of knowledge that strictly empirical methods of verification cannot attain, but it still sees knowledge as a form of control of natural phenomena, if by different means. As Owen (2004: 349) states, “Occultism was often represented as a science, and occultists played the straightforward rule that specific magical procedures produce predictable and specified results. This is what characterizes magic...”.

<sup>159</sup> The official history of each society can be found on their current website, together with current research projects: <https://www.spr.ac.uk/> for SPR and <http://www.aspr.com/> for ASPR.

founder of the ASPR, which remained independent from the SPR until 1889 (Sommer 2012; 2016). In particular, my focus will be on the debates concerning the possibility of investigating psychical phenomena scientifically, and on the notions of science which emerge from this discussion. Both James and Peirce contributed to it, and from their reaction much can be extracted of their respective psychology and philosophy of science.

In 1886, Gurney, Myers and Podmore published a two-volumes study of apparitions, *Phantasms of the Living*. The study collects “experiments” in thought-transference and “spontaneous” cases of “veridical apparitions,” i.e. apparitions whose contents were thoroughly checked by the authors, of still living persons to other living persons. The reason for focusing on the living was mostly that it allowed to talk of thought transmission without the metaphysical problem of disembodied thought (i.e., thought coming from a person whose physical support was long gone). In short, *Phantasms* was about “[a]ll transmissions of thought and feeling from one person to another, by other means than through the recognised channels of sense” (1886, v.1: vi). James and Peirce reviewed the book separately in 1887. Peirce’s review, titled “Criticism on *Phantasms of the Living*,” started a debate that went on until 1889, the year Gurney died. Before plunging into the details of this debate, it is worth noting some commonalities to the two reviews, which reflect two essential aspects of the discussion of telepathic phenomena: (1) the notion of evidence as a bundle (“faggot”) of facts (Gurney et al., 1886: 19; James 1896: 318); (2) the emphasis on the researcher’s character and reputation.

The notion of evidence as a “faggot” appears already in *Phantasms*.<sup>160</sup> In discussing their methodology, the authors stated that the abundance of independent facts exhibited supported their claim on mind communication even better than reputation. They recognised that people who did not experience telepathic phenomena directly or who were not closely acquainted with someone who did would be reluctant to take the matter seriously. According to Gurney et al., readers of *Phantasms* were perfectly justified in requiring a lot of evidence, and it was the society of psychical research’s task to provide it. This point was illustrated with a metaphor: if each piece of evidence is compared to a stick, “[t]hey [readers] cannot be absolutely certain that this, that, or the other stick might not break; then enough sticks must be collected and tied together to make a faggot of a strength which shall defy suspicion” (Gurney et al. 1886: 19).

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<sup>160</sup> The term “faggot” (spelled “fagot” by James) is used here in its archaic sense of “bundle.”

Peirce had already formulated a metaphor for science as a “cable” in his 1868 paper “Some Consequences of Four Incapacities,” suggesting that philosophy should follow science in understanding evidence:

Philosophy ought to imitate the successful sciences in its methods, so far as to proceed only from tangible premises which can be subjected to careful scrutiny, and to trust rather to the multitude and variety of its arguments than to the conclusiveness of any one. Its reasoning should not form a chain which is no stronger than its weakest link, but a cable whose fibres may be ever so slender, provided they are sufficiently numerous and intimately connected. (W2: 213).

James picked up the notion of evidence as a “fagot” as well as its opposition to the chain-like structure of evidence in his chapter “What Psychological Research Has Accomplished.” Parts of this text had appeared in print since 1890, and part were delivered as a presidential address before the ASPR in 1896. In 1907, it was reprinted as part of *The Will to Believe*. There, James stated:

Now, the evidence for telepathy, weak and strong, taken just as it comes, forms a fagot and not a chain. No one item cites the content of another item as part of its own proof. But taken together the items have a certain general consistency; there is a method in their madness, so to speak. So each of them adds presumptive value to the lot; and cumulatively, as no candid mind can fail to see, they subtract presumptive force from the orthodox belief that there can be nothing in any one's intellect that has not come in through ordinary experiences of sense. (James 1907: 318).

James' frequent separation of evidence and common sense contrasted with Peirce's position. Peirce, unwilling to dismiss telepathic phenomena straight away, believed however in bringing them back to common sense phenomena. If the need for a “fagot” of evidential “sticks” is part of the response to the problem of trust that the scientist investigating a new terrain has to face, for Peirce scientific inquiry *normally* sustains itself through a “cable”-like collection of evidence, in which the most important property of its individual “fibres” is not strength but sticking together.



As noted, besides the number of independent evidence, the moral qualities of the scientist were considered important to gain credibility (Gurney et al. 1886: 19). James ([1896]) added to the moral code of conduct of the psychical researcher a code of conduct for the fellow scientist who reads their results: they have to possess, above all, a “candid mind.” However, most of the weight remained on the psychical researcher’s shoulders. This brings us to the second point, namely, the negotiation of the scientists’ character and reputation.

As Francesca Bordogna (2008: 93-4) remarks, psychical researchers needed first and foremost to establish their reputation as honest, logical, reliable men, on a totally disinterested quest for truth. This is particularly clear from the opening of James’ review of Gurney, Myers and Podmore’s work:

In any reputable department of science the qualities displayed in these volumes would be reckoned superlatively good. Untiring zeal in collecting facts, and patience in seeking to make them accurate; learning, of the solidest sort, in discussing them; in theorizing, subtlety and originality, and, above all, fairness, for the work absolutely reeks with candor, – this combination of characters is assuredly not found in every bit of so-called scientific research that is published in our day. (James 1887: 18-19).

The moral qualities displayed by the researchers, while they cannot be an assurance for the truth of the facts described, would enable the reader to attribute the blame for an eventual blunder not to the scientists themselves but to the (for James, epistemically and morally) lower classes, who may hack the scientist’s genuine call for true information: “Messrs. Gurney, Myers, and Podmore” could be “*victims*, partly of the tendency to hoax, but mainly of the false memories and mythopoeitic instincts of mankind” (James 1887, 19; emphasis added). To counter these negative “instincts of mankind” the true scientific temper must possess an equally strong and opposed “instinct” for “good and bad evidence”:

It therefore comes back essentially to the investigator’s instinct, or *nose*, as one might call it, for good and bad evidence. A born dupe will go astray, with every precaution; a born judge will keep the path, with few. (James 1887: 19. Emphasis of the text).

The aristocratic tone of these and other expressions of James (“a *born dupe*,” “a *born judge*”) has not been lost on commentators (Bordogna 2008). Indeed, the identity of the scientist at the end of the century, especially in controversial contexts such as psychical studies, was built on a variety of apparently incompatible qualities: an inborn instinct for the truth and a tireless, “zealous” attitude to research; “subtlety” and “candor;” mastery of their own object, and a voluntary effacing of the scientist’s beliefs and even point of view in face of the evidence (Bordogna 2008: 101).

Peirce’s 1887 review, appeared on the *Proceedings of the American Society for Psychical Research*, also shows a tendency to pass *moral* judgement over the scientific personae of Gurney, Myers, and Podmore as it examines the evidence presented in *Phantasms*. Although in successive rejoinders Peirce adopted a harsher tone on Gurney, in his 1902 MS telepathy Peirce expressed a thoroughly positive judgement on the man: “I was most strongly impressed with the purity of his devotion to the truth” (CP 7.612). Indeed, Peirce seems to have taken as a given – like his contemporaries – the intertwinement of epistemic and moral judgements in evaluating individual scientists, their methods, and the evidence that they presented. In the case of telepathic phenomena, Peirce justified such practice with the extraordinary importance of testimony in the construction of a scientific fact:

After all, the reader, who cannot cross-examine the witnesses, and search out new testimony, must necessarily rely upon Messrs. Gurney, Myers, and Podmore having on the whole performed this task well; and we cannot accept any case at all at their hands, unless, as far as we can see, they have proved themselves cautious men, shrewd observers, and severe logicians. (W6: 80).

The insistence on the moral qualities of the scientist had been indeed a fundamental piece of natural philosophy’s rhetoric since the 1660s, when Robert Boyle’s air pump fuelled hot debates on the nature of the phenomena observed (Shapin and Schaffer 1985). Boyle’s strategy of presenting himself as a dedicated, open, methodical man, his detailed descriptions of experiments and of their witnesses, would have met Peirce’s requirements for Gurney, Myers, and Podmore: “cautious men, shrewd observers, and severe logicians.” Peirce’s need to set high moral standards for psychical researchers only aligns with the general attitude of his contemporaries and shows that, when a scientific field is new and its phenomena difficult to observe or to replicate, the

alleged “facts” cannot speak for themselves. In fact, the probity of the psychical investigator was to a great extent the object of contention when discussing the possibility that psychical phenomena may be scientific (Bordogna 2008).

Together with the moral evaluation of the probity of the investigator comes the apparently purely epistemic notion of “expertise.” James’ defence of Gurney, Myers and Podmore’s work pressed the point that the three men were “experts” in their field, and therefore criticism from other special scientists had to be met with the awareness that other special scientists were coming from a position of relative ignorance and possibly prejudice:

Meanwhile it must be remembered, that, so far as expertness in judging of truth comes from training, no reader can possibly be as expert as the authors. The way to become expert in a matter is to get lots of experience of that particular matter. Neither a specialist in nervous diseases, nor a criminal lawyer, will be expert in dealing with these stories until he has had Messrs. Gurney's, Myers's, and Podmore's special education. (James 1887: 19).

Peirce was not unaware of the demand for informed opinions and qualifications of expertise. In fact, objections were raised against the study of telepathic phenomena both from the physical scientists and from the psychologists, the latter being especially anxious to distinguish their object of study from unscientific pursuits.<sup>161</sup> In his 1902 MS *Telepathy* Peirce detailed his position on telepathic phenomena extensively and, by proposing an account of them that would fit into a theory of ordinary perception, also revisited his former philosophical analysis of perception. Peirce claimed to possess the knowledge necessary to pass a judgement on the issue by recollecting his long-term engagement with both experimental physics and psychology:

For I was trained from the boyhood in physics, have mostly associated with physicists, and fully share their prejudices, whether legitimate or illegitimate. [...] Thus I have little need of consulting with others to do full justice to the typical physicist’s disapproval of the hypothesis and the methods of the

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<sup>161</sup> Thus Stanley Hall, first president of the American Psychological Association (1892), and Joseph Jastrow, APA president since 1900, were among the strongest opponents of psychical research. See Clark L. Hull (1944: 581); Bordogna (2008: 104; 130).

telepathists. On the other hand, ever since Wundt inaugurated the modern science of psychology about 1862 (the date of the collected publication of his *Beiträge zur Theorie der Sinneswahrnehmung*), I have pursued that study both experimentally and speculatively, and I am thus better able than some physicists to appreciate the opinions of the psychologists. (Peirce 1902, CP 7.597).

Peirce was responding to a recent controversy between John Trowbridge (a physicist of the time) and William James on the opportunity for a scientifically-inclined man to study psychical phenomena, a debate which inevitably touched upon the nature of such phenomena and their relationship to scientific facts. The “little passage of arms between a physicist of standing and a celebrated psychologist” (Peirce 1902, CP 7.597) was, for Peirce, an occasion to dwell with “the typical physicist attitude toward the hypothesis of telepathy and toward psychical research.” Moreover, the debate between Trowbridge and James was for Peirce the perfect opportunity to advance his own notion of scientific fact. This connects to two important ideas which will be analysed more in detail in the following: intelligibility and common sense. Both have a prominent role and guide Peirce’s choice of scientific theories as well as his metaphysical speculations.

For Peirce, an event is intelligible if an explanation can be found for it. A “scientific fact” is by definition an “intelligible fact,” i.e., a fact of which either we possess an explanation or that we hope one day to explain. Explanation, for Peirce, means the exhibition of the position of the fact in a web of relations with other facts, already known. Thus, for Peirce “what is absolutely severed and sundred from the body of ordinary experience is absolutely beyond scientific comprehension” (Peirce 1902, CP 7.601). Gurney, Myers and Podmore’s definition of telepathy is that of communication “*by other means* than through the recognised channels of sense” (1886: xxxv-xxxvi; emphasis added). However, if the communication happens by “extraordinary” means, there is no hope – in Peirce’s perspective – to put it in a system of relations and thereby to explain it. Peirce in his initial review took a stance against telepathic phenomena from the point of view of common sense; he did not deny the possibility that there are such facts, only that “miracles and mysteries” be a genuine contribution to science. In looking back at his quarrel with Gurney almost 20 years later (*Telepathy MS*, c.1903), Peirce explicitly linked his position with the aforementioned “physicist attitude”:

Sharing these sentiments common to all physicists, when *Phantasms of the Living* appeared [...] I felt that I would far sooner believe in spiritualism [than in telepathy]. For according to this [...] theory [spiritualism], we *all* pass into another life; nor would this experience common to us all be much more wonderful than the development that we all undergo when the child becomes a grown person. [...] Surely, the canyon that spiritualism has to suppose between the two worlds has a gentle slope compared with the abyss that telepathy opens in the midst of experience between the ordinary and extraordinary intercommunion between minds. (CP 7.603. Emphasis of the text).

In this passage Peirce motivates his “physicist attitude” towards telepathic phenomena with reference to another important aspect of his philosophy and metaphysics – the notion of continuity. Imagining a continuous progression between the present world and an afterlife makes more sense, in Peirce’s view, than imagining a radical break in this present life between “ordinary” means of communication and (rare and inexplicable) telepathic phenomena. Peirce’s response to Trowbridge’s “physicist attitude” further explicates where Peirce actually followed the mainstream criticism of psychical phenomena and where he was distancing himself from it.

John Trowbridge (1843-1923), an American physicist, supported his argument against telepathy with the following points: (1) the “utter lack of history” of telepathic phenomena as scientific facts, and (2) the idea that dedication to laboratory work is tiresome and may lead “small, through precious, returns,” so that scientists at the end of their career “find it easier to philosophize and to write their thoughts rather than to put them to the test of experiment” (Trowbridge 1903: 309). Peirce, although sharing with Trowbridge the “physicist attitude” regarding scientific facts and his worry that pursuing the study of psychical phenomena may “compromise” the scientific career of “young men” (CP 7. 597), disagrees with the specific points of Trowbridge’s criticism. Trowbridge identifies the “lack of history” of telepathic phenomena with the absence of a record for scientific practice: “Telepathy has no instruments for measurements; it has no reagents; it has no history of past phenomena leading up to a possibility” (Trowbridge 1903: 309). Peirce counters:

Prof. Trowbridge complains that they [psychic researchers] make no measurements; and that coincides with my complaint that they have not sufficiently endeavoured to bring their marvels into relation with ordinary experience. For, in order to do that, *the phenomena would have to be analyzed; and then, and not before, would measurements have been applicable*. Prof. Trowbridge will not forget that in the early stages of physics, there were no measures. Galileo, Gilbert and others made considerable progress before they arrived at a stage at which they were able to make any measurement to speak of. But they did exhibit great skill in analyzing the phenomena... (CP 7.614. Emphasis added).

Peirce's efforts in *Telepathy* were thus directed towards analysing those phenomena into something that can be put into relation with ordinary experience: briefly, his aim was a re-comprehension of so-called telepathic phenomena into a unified theory of perception.<sup>162</sup>

Notably, James' attitude towards psychical phenomena was very different from Peirce's. The difference can be explained by taking into account the opposing notions of "scientific fact" that the two men endorsed. In the 1896 essay "What Psychical Research Has Accomplished" (already introduced), James took *exceptions* and isolated facts as the proper object of scientific inquiry – indeed, the only objects which are genuinely fostering the advance of knowledge:

Round about the accredited and orderly facts of every science there ever floats a sort of dust-cloud of exceptional observations, of occurrences minute and irregular and seldom met with, which it always proves more easy to ignore than to attend to. [...] Only the born geniuses let themselves be worried and fascinated by these outstanding exceptions, and get no peace till they are brought within the fold. Your Galileos, Galvanis, Fresnels, Purkinjes, and Darwins are always getting confounded and troubled by insignificant things. Any one will renovate his science who will steadily look after the irregular phenomena. (James 1896: 299-300).

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<sup>162</sup> The topic of the re-comprehension of telepathic phenomena into a unified theory of perception is at the core of the analysis of *Telepathy* in Chapter 6.

James' fascination with the "dust-cloud of exceptional observations," the "irregular" and the individual which escape totalizing classification, stresses a different reason why telepathic phenomena should be object of scientific inquiry. In the end, such "outstanding exception" will also be "brought within the fold," i.e. systematised; but for James, the renewed science will have "the voice of the exceptions [...] [rather] than of what were supposed to be the rules" (James 1896: 300).

For Peirce, however, if something can be shown to exist in relation with other already acknowledged facts, it thereby ceases to possess the mysterious and puzzling exceptionality that so much fascinated James. For this reason, Peirce stated that he would rather side with spiritualism than with telepathy (CP 7.603). In a 1890 manuscript, titled "Logic and Spiritualism" by the Peirce Edition Project, Peirce compared spiritualism and its phenomena with common sense and common experience, examining the relation between special knowledge and common knowledge in science. It is to this analysis that I turn in the next section.

## 5.2 Peirce and spiritualism

Contrary to what is stated by Stephen E. Braude (1998), "Logic and Spiritualism" was not written in 1905 but in 1890, as the "Textual apparatus" of volume 6 of the *Writings* explains (W6: 658-63). The piece was conceived for *The Forum*, where its founding editor, Loretus Sutton Metcalf, "orchestrated a debate on spiritualism" (W6: 659) as he did for other controversial issues.<sup>163</sup> Braude got the wrong information on the date of "Logic and Spiritualism" from CP 6.557, however he rightly identified this and the "Telepathy" MS as "the two most extensive pieces Peirce wrote on parapsychology" (Braude 1998: 225). The new dating makes "Logic and Spiritualism" an important sign of Peirce's continuous engagement with psychical phenomena and the question of their scientific value. This question, for Peirce, boiled down to their relationship with ordinary, common sense phenomena, and was further analysed in the "Telepathy" MS (1903) in terms of their relationship with ordinary perception.

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<sup>163</sup> Previous items were Mary J. Savage's "Experiences with Spiritualism" (December 1889) and Richard Hodgson's "Truth and Fraud in Spiritualism" (April 1890). Hodgson was secretary and assistant treasurer of the ASPR.

“Logic and Spiritualism” was never published because of a protracted dispute between Peirce and the editor over the length of the article. Unwilling to cut entire paragraphs, as the editor requested, to keep his text within the 5,000 words limit, Peirce adopted a telegraphic style, cutting out articles, adjectives, sometimes even pronouns. Eventually, the inability of the two sides to reach any kind of compromise made this another of Peirce’s many unpublished manuscripts. The Peirce Edition Project maintained Peirce’s telegraphic style and strived to present a text which is as close as possible to what Peirce may have meant to convey with this article.

Peirce started by exposing the controversial appreciation of a variety of “facts” newly invoked to support or to discard spiritualist theories: “Facts, new or newly published, rappings, table-turnings, with different predispositions opining differently, started controversy concerning Spiritualism” (W6: 380). The variety of “facts” concerning spiritualism is received differently according to the different inclinations of the people hearing of them. Thus, Peirce’s aim in his contribution is not to push the reader towards a “definitive judgement *pro* or *con* (which mostly is not safe while controversy rages), as to assign it its schematic place in the natural history of opinion” (W6: 380-1). Peirce’s strategy is to inscribe the arguments around spiritualism in a broader problem, that of the relative weight of special and common-sensical knowledge in science.

Towards the end, Peirce also tried to bring the question of spiritualism into the problem of mind-body relation, to which he offers a tentative answer in philosophical terms (W6: 391-3). Following recent historiography on experimental psychology (Pearce 2018, Schloegel and Schmidgen 2002), I connect that philosophical answer, which plainly constitutes a sketch of the evolutionary cosmology Peirce would describe more fully in his 1891-3 *Monist* metaphysical papers, to research of the time on “physiological psychology” or “general psychology”: the study of the psychical state of unicellular organisms (protozoa, then referred to as “protoplasm”) and simple organisms like echinoderms (e.g., the star-fish; see sec. 5.3). Peirce himself classified “Experimental Psychology” and “Physiological Psychology” together with “Introspective Psychology” as branches of psychology in his 1901 classification of the sciences (CP 1.199); this classification is maintained throughout most of Peirce’s many drafts on the classification of the sciences (Pietarinen 2006: 130-1, n. 6 of p. 130).

Thus, if the first line of Peirce’s argument on spiritualism in the 1890 paper is a discussion of the relative importance of ordinary facts and special facts in science, the



ending connects this debate with nineteenth-century research on non-human psychology. Remote as this may seem from common sense, physiological psychology was in fact an attempt to make psychic life as general and pervasive as possible. Moreover, as we will see (5.3), Peirce further recurred to common sense to orient himself in the debate over an “idealist” (i.e., vitalist) or a mechanist interpretation of protoplasmic life.

While setting up his argument on the relative weight of special or common facts in science, Peirce admitted his professional formation: “I run up my colors and confess myself a scientific specialist” (W6: 281). This formation notwithstanding, he proceeded by noticing an embarrassing similarity between the special facts cherished by scientists and the special facts defended by spiritualists:

So, some experiences are inapprehensible because minute and recondite. They are (a) scientific observations, only feasible with special instrumental aids, under special precautions, by virtue of special skills; they are (b) strange adventures, happening dependent on rare chances fallen to few people, unrepeatable at pleasure. [...] Have we professional men often been found *underrating* the importance of special orders of facts we have spent our lives acquiring and in learning how to acquire? (W6: 383. Emphasis of the text).

Pitted against *both* scientific specialists and spiritualists as the worshippers of special facts, Peirce’s article is a passionate defence of the “squeezed lemons” of common experience (W6: 384). The distance from reasoning to scientific experimentation is closed: as seen in the previous chapters, reasoning *is* a kind of experimentation (but see also W6: 386; W8: 19, also written in 1890, where experimentation explicitly involves most of the senses).<sup>164</sup> The success of our inferences depends on commonsensical

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<sup>164</sup> Peirce 1890, “Sketch of a New Philosophy,” Spring 1890: “It is not a historical fact that the best thinking has been done by words, or aural images. It has been performed by means of visual images and muscular imagination. *In reasoning of the best kind, an imaginary experiment is performed.* The result is inwardly observed, and is as unexpected as that of a physical experiment. On the other hand, the success of outward experimentation depends on there being a reason in nature. Thus, reasoning and experimentation are essentially analogous” (W8: 19; emphasis added). “Aural images” are here images for the ear, i.e. words; visual images are of course images for the eye, while “muscular imagination” could be paraphrased as “sensory-motor imagination” (it is not to be interpreted as “strong imagination”!). In this interpretation, the body *is* creative,

assumptions concerning the regularity of nature and on an almost mystical faith that human mind and natural laws are indeed part of one and the same rationality. "...what happens once happens always; nature follows general laws, in other words, has a reason" (W6: 386; see also W8: 19).

Quoting Michael Faraday (1791-1867), who was building on the old theme (dating back at least to Galileo) of scientific inquiry as the way to "read into" nature's secrets, Peirce commented:

Successful research – say Faraday's – is conversation with nature; the macrocosmic reason, and the equally occult microcosmic law, must act together or alternatively, 'till the mind is in tune with nature. [...] A scientific man is simply one who has been trained to conduct observations of some special kind, with which his distinctive business begins and ends. Nevertheless, reasoning from familiar experience plays a great role in science: it lays the indispensable foundation, is needful in frequent later conjunctures. (W6: 386).

The way in which natural scientists in the sixteenth and seventeenth century were in fact restating traditionally magic or mystic beliefs in the continuity between the structure of human's mind and the structure of the world, and the consequent possibility for the initiated to gain knowledge of nature's secrets, either by forcing nature to answer man's questions, or by engaging in a mutually respectful conversation, was recently reconstructed by Andreas Sommer (Sommer 2013, Ch. 1). Here, Peirce's "macrocosmic reasons" – i.e., the expected regularity of nature's behaviour – and "microcosmic law" – i.e., the scientific laws discovered by man – are equally defined "occult": they do not lay bare in the open and necessitate of specific training to be acknowledged.

The parallelism that Peirce here traces between nature's and man's "reason" reminds of Fechner's parallel model of the physical and psychical (seen in Chapter 3). Fechner too assigned great importance to the *unconscious* and its operations. According to Peirce, the "indispensable foundation" of common sense is mostly unconsciously built. Peirce maintained that we are just as blind to ordinary experience as we are to specific

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not just through the "bodily memory" but also through active bodily imagination. See also Peirce 1890, [On Framing Philosophical Theories], W8: 24: "Good reasoning is concerned with visual and muscular images. Auricular [sic.] ideas are the source of most unsound thinking."

scientific phenomena when deprived of equipment or training (W6: 383). Thus, while common sense appears as a ground and starting point of all knowledge for our waking consciousness, it is in fact itself a product of inferences and conjectures, a fallible platform which is however the only possible starting point for conscious inquiry.

As Peirce specifies later in the article, “Common sense corrects itself, improves its conclusions” (W6: 388). This is true of common-sense in its “self-conscious kind,” such as that displayed concerning ideas of motion, gradually evolving into the science of dynamics (W6: 388); also, it is true for its more subtle and pervasive unconscious component. Indeed, for Peirce acknowledging the existence of unconscious processes and their role in the formation of our knowledge is the single most important step distinguishing “modern psychology” from Cartesian psychology:

The doctrine of Descartes, that the mind consists solely of that which directly asserts itself in unitary consciousness, modern scientific psychology altogether reject [sic.]. Swarming facts positively leave no doubt that vivid consciousness, subject to attention and control, embraces at any one moment a mere scrap of our psychical activity. [...] three propositions may be laid down. 1. The obscure part of the mind is the principal part. 2. It acts with far more unerring accuracy than the rest. 3. It is almost infinitely more delicate in its sensibilities. (W6: 386).

The first of these three propositions – that “the obscure part of the mind is the principal part” is already present in Leibniz, and the influence of Leibniz’s thought on Peirce has been recently documented by Bellucci (2015). Its “unerring accuracy” and “delicate sensibilities” had been the object of Peirce’s experimental investigation in his paper “On Small Differences of Sensation,” written with Joseph Jastrow in 1885.<sup>165</sup> Amidst the end-of-century frenzy for self-measuring instruments and mechanised observation, the quest for objectivity was particularly pressing in the field of psychical research (Bordogna 2008). Such a problem had been familiar to astronomers since Bessel’s introduction of the “personal equation” in 1820.<sup>166</sup> Peirce, on the one hand, rejected the automatic association between objectivity and mechanical recording, as

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<sup>165</sup> I illustrated this paper in Chapter 4.

<sup>166</sup> I illustrated the connection between experimental psychology and astronomy and the role of Bessel’s equation in Ch. 4.

showed by his comments on Marey's photographic studies of movement and his more thorough discussion of Galton's composite portraits technology (Ambrosio 2016). On the other hand, Peirce proposed that the greatest part of our psychical activities was both unconscious and overall closer to the accuracy of self-recording instruments than conscious judgement could normally be:

Man's fully conscious inferences have no quantitative delicacy, except where they repose on arithmetic and measurement, which are mechanical processes; and they are almost as likely as not to be downright blunders. But unconscious or semi-conscious irreflective judgements of mother-wit, like instinctive inferences in brutes, answer questions of "how much" with curious accuracy; and are seldom totally mistaken. Conclusions men reach they know not how, are better than those fortified by unscientific logic. (W6: 386-7).

Mathematics was thus presented, in this 1890 article, as an element of mechanization in conscious thought; it did not foster *understanding* of the thinking processes as logic did, yet it provided the accuracy that conscious thought normally lacked. Moreover, the "instinctive inferences" that would put together data drawn from our sensory receptors and bring about general ideas for the intellect – such as the idea of *Space* – were for Peirce a testimony to the extraordinary power of our unconscious, as well as an instance of the inferential theory of perception such as advocated by Wundt and Helmholtz:<sup>167</sup>

From data of sensations proper to hundreds of nerve-terminals in the optic retina, combined with certain muscular sensations – premises more tangled and confused than tongue can tell or brain can think – common sense has extricated the marvellously clear and beautiful conception, Space. (W6: 388).

This inferential theory of perception, which is here given as a generally accepted result of psychological research, will be better qualified and in part challenged in the "Telepathy" MS (c.1903), in which Peirce will explore the implications of his theory of perception in greater detail. In 1890, the question of spiritualism was recast by Peirce principally as the question of the relation between special knowledge and common-sense knowledge *within* science itself. It is in this framework that the importance of the relation

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<sup>167</sup> I illustrated the influences of Wundt and Helmholtz in Chapters 1 and 3 respectively.

of mind and body for the solution of the question of spiritualism appeared to Peirce: “Completely satisfactory discussion of the question of Spiritualism would involve satisfactory theory of connection of soul and body, which is not perhaps forthcoming” (W6: 391). In understanding this connection, Peirce maintained, common sense had to remain a guide; only thus the special results coming from science would be properly understood.

In his draft, Peirce wrote that “Strictly speaking, there is no direct argument against spiritualism and telepathy. All the direct reasons are just the other way” (W6: 393; R 880: 3). He was personally not inclined to believe in the phenomena described by spiritualists, i.e. the “facts” such as “rappings” and “table turnings” referred to at the beginning of the article, nor in telepathic phenomena. However, he also thought that psychical research was a subject worth pursuing. If in the 1903 “Telepathy” Peirce stressed the danger to which psychical researchers exposed themselves, namely that all their research may lead to nothing but “a distressing acknowledgement of failure” (CP 7.597), in 1890 he praised their efforts while clearly putting psychical research within psychology’s scientific terrain:

Meantime, those who are engaged in psychical research should receive every encouragement. They may have reached little or no result, so far; perhaps will not till they dismiss the phantom of telepathy from their minds. But scientific men, working in something like scientific ways, must ultimately reach scientific results. Psychology is destined to be the most important experimental research of the twentieth century; fifty years hence its wonders may be expected to occupy popular imagination as wonders of electricity do now. (W6: 394).

Peirce’s choice to put psychical research within the province of psychology provides further support for Sommer’s (2013) thesis that “from the early 1880s to ca. 1910, it was often difficult if not impossible to draw a clear distinction between psychology and psychical research” (2013: 3). Indeed, Peirce is here proposing to foster psychical research through (“perhaps”) the dismissal of telepathy, i.e. the idea that one mind could act on another mind from a distance. I dwell on Peirce’s own account of how one mind could act on another in the next chapter (Ch. 6).

In the following section, I suggest that, if the distinction between psychology and psychical research was difficult to draw, this encompassed not just psycho-physics – for which Wundt’s Leipzig laboratory provided an undiscussed model – but also “general psychology” or “physiological psychology.” These sciences aimed to extend psychological inquiry to all non-human living beings and to the theory uniting all biological organisms, namely evolution. They thus extended the domain of psychical action far beyond the reach of consciousness and indeed beyond the nowadays common requirement for the existence of a nervous system. As Judy J. Schloegel and Henning Schmidgen show, “experimental psychology” at the turn of the century encompassed a broader terrain than psychophysics and had in general psychology an essential component (Schloegel and Schmidgen 2002).

### 5.3 Protoplasm, common sense, and the logical foundation of Peirce’s evolutionary metaphysics

The object of investigation of general psychology was the psychical and physiological organization of unicellular organisms, usually referred to as “protozoa” or with the name of one of their most popular classes, “infusoria.” In particular, physiological psychologists and evolutionary biologists discussed the psychical properties of the plasmatic jelly constituting animal and vegetal cells alike and known as “protoplasm” (Alfred Binet 1887, “La vie psychique des micro-organismes” [the psychical life of microorganisms]; Ernst Haeckel 1878, “Zellseelen und Seelenzellen” [cellular minds and mental cells] are two of the most noteworthy examples).

Peirce, who was not a professional psychologist, engaged with psycho-physics and the measurement of differences in perception in 1884-5 and before; in the years 1886-90, he sustained a debate over *Phantasms of the Living* and was asked to express his views on the scientific validity of spiritualism; in his writings of the early 1890s, in particular “The Law of Mind” (1891), “Man’s Glassy Essence” (1892) and “Evolutionary Love” (1893), he drew on general psychology and inscribed his own, original interpretation of protoplasm in his metaphysical account of evolution (Pearce 2018). While scholars often emphasised the contrasts between one or the other of these three lines of research, they were clearly not perceived as separate enterprises by Peirce nor by his contemporaries. In order to fully understand Peirce’s argument for the role of common sense in science and

in the study of psychical phenomena more particularly, it will be useful to look at his use of protoplasm as a fundamental psychic unity of “feeling.”

In his rejected article on spiritualism (1890), Peirce suggested that the question of spiritualism could only be settled with a “satisfactory theory of connection of soul and body” in hand, a theory “which is not perhaps forthcoming” (W6: 391). While this claim could have been read as an expression of metaphysical disillusion, it is now clear that it reflected hotly debated questions in physiology and general psychology (Pearce 2018). In the 1890 article Peirce’s remarks are indeed cryptic, the editorial word-limit taking its toll: it is difficult to understand whether Peirce is proposing some kind of vitalism or idealism as a hypothetical theory of the connection of body and soul. In fact, this connection is not explicitly thematised. Feelings – we are told – are the “immediately living” (W6: 393); they spread and associate, gradually taking habits and thereby losing spontaneity. Habits spread, and associations of habits grow in generality until they become laws of nature; spontaneity is gradually reduced by increasing habit, matter being nothing but feeling that has lost all spontaneity.

Peirce’s compressed account has to be read within the context of general psychology at the time (Pearce 2018). Much of the scientist’s efforts revolved around the question of whether protoplasm exhibited psychical life or whether its actions were just the automatic response of a well-designed mechanism. Authors writing in the first numbers of *Monist*, reviewed by Peirce for *The Nation* (W8: 42-3), were dwelling precisely on this problem. Binet, for example, argued for the psychical life of microorganisms and amoebas (1887, 1890); Carus Sterne for the psychical activity of “*many-souled* animals,” i.e. animals, like “fresh water polyps” and starfishes, whose parts appeared to possess autonomy of movement, decision, and even the power to regenerate the rest of the organism, wholly or in part (Sterne 1891: 164). The protoplasm debate helped define the materialist and the spiritualist strands of the theory of evolution: at the bottom lies the question of whether the driving force in the development of the organism (as well as of the universe) was of physical or of psychical nature.

From Peirce’s brief account in the “Logic and Spiritualism” article draft, it could be inferred that he was in favour of vitalism, i.e. of supposing a psychic foundation to evolution, since he wrote: “The free is the living; the immediately living is *feeling*. Feeling, then, is assumed as starting-point” (W6: 393; emphasis of the text). Possibly the most problematic part of this quote is the idea that feeling be a *starting point*: what

happened to Peirce's historical rejection of "firsts," groundings, and axioms? However, a more careful reading of notes and drafts for projected works written in the same year (1890), as well as key-passages from a series of papers appearing in 1892-3, the so-called "*Monist metaphysical series*," show that Peirce was not being a vitalist in the sense of making psychical life the "ground" of the physical world. Peirce's peculiar strand of vitalism does not exclude physical, and especially chemical and molecular investigations of the cell. Peirce's interest in the molecular structure of protoplasm and its relation to its psychical properties becomes explicit first in preparatory notes for "Men's Glassy Essence" (Peirce 1982; W8: 158; 164) and then in the article itself (W8: 165ff.).

The specific brand of vitalism that Peirce endorses in "Logic and Spiritualism" has to be understood as yet another move in defence of the epistemic value of common sense. In the 1890 draft "Sketch of a New Philosophy," Peirce noted: "The monism of the modern psychologists is really materialism. The unreasonableness of it. *The idea of supposing a particular kind of machine feels is repugnant to good senses and scientific logic*" (W8: 22; emphasis added). Materialism, according to this quick note, is both unreasonable and "repugnant." Peirce expanded on this point in his 1890 review of Ribot's *Psychology of Attention*, issued in *The Nation*:

In our day, the charge of being materialist will scare nobody; and all the facts of life show dependence of soul upon body. *Yet common sense will never admit that feeling can result from any mechanical contrivance*; and sound logic refuses to accept the makeshift hypothesis that consciousness is an "ultimate" property of matter in general or of any chemical substance. (W8: 15; emphasis added).

Peirce is rejecting at the same time the notion that "feeling" – i.e., anything psychical – is the outcome of purely physical processes and the idea that consciousness itself be a "ultimate" – i.e., not further explainable – "property of matter." As Peirce stressed on many occasions, saying of something that it is an "ultimate" phenomenon plainly means to treat it as absolutely unexplainable. If this would be illogical, the first option – i.e., attributing psychical phenomena to purely mechanical processes – repels "common-sense," and is therefore to be looked upon with suspicion.

Peirce could have found a significant precedent for the "common-sensical" attribution of psychical states – such as feeling – to animals, no matter how simple, in the



early writings of Wilhelm Wundt. As seen in previous chapters (see esp. Ch. 1), Wundt's early writings (1862-3) were one of the most influential sources for the development of Peirce's own psychology as well as for his understanding of the relation between logic and psychology. In regard to evolution, Wundt would also dissociate himself from purely mechanical accounts. As evidenced by his essays of the 1880s and 1890s, Wundt "virtually abandoned natural selection for internal, vital principles of psychical evolution" (Richards 1987: 523; Wundt 1885, "Die Thierpsychologie," in *Essays*, and *Grundriss der Psychologie*, 1896).

Wundt's inclination for attributing psychical life to animals was apparent already in his 1862 *Vorlesungen über die Menschen- und Thierseele*, which literally translates as "Lectures on the Soul of Men and Animal."<sup>168</sup> According to Richards, Wundt's vitalism developed at the intersection of philosophical and scientific theories: "Under the influence of Hegel, Fichte, and Fechner" – Richards writes – "he [Wundt] was prepared to discover the glimmerings of consciousness even among the infusoria and to trace its development into the transcendent brilliance of human reason" (Richards 1987: 521). In 1862, Wundt explicitly acknowledged the psychical nature of animal behaviour and significantly focused on the "lowest classes of animals," starting from the unicellular organisms of the "infusoria" class: "Already in the lowest classes of animals, by infusoria, polyps, jellyfish, we find expressions of life which suggest [hindeuten] a certain insight" (Wundt 1862, 444).<sup>169</sup>

The belief in a psychical life of animals rested, for Wundt, on "hints" – as belief in the unconscious inferences of our mental processes did. Both the animals' psychical life and human perceptual processes could not be directly observed and were therefore inferred from outer manifestations:

Faced with the outer manifestations of the animals' mind we find ourselves in the same position, in which we were when researching unconscious mental processes. There too only the results are given: we have to translate in the

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<sup>168</sup> In spite of the fact that "Seele" literally means "soul," in the following of the chapter I translate "Seele" with "mind," in accordance with the English custom and with previous translations in this work.

<sup>169</sup> "Schon in den niedersten Thierklassen, bei den Infusorien, Polypen, Quallen, finden wir Lebensäußerungen, die auf eiene gewisse Erkenntniß hindeuten." (Wundt 1862: 444).

language of our own consciousness the processes which brought those results about. (Wundt 1862: 443).<sup>170</sup>

Thus, if we are justified in inferring unconscious processes underlying our conscious perceptions, we can be equally justified in attributing psychical life to animals' actions. This parallel between the attribution of feeling to animals and the attribution of a logical structure to perception suggests a possible reason why Peirce would not have seen his relying on feeling as an instance of foundationalism: on the one hand, feeling was the result of the inferential process of perception; on the other hand, the line of reasoning behind the idea that the structure of perception is inferential was equally applicable to support the attribution of feeling to protoplasm.

If it is reasonable to suppose that Wundt's bent for vitalism left a mark on Peirce, it did not pass unnoticed in the realm of psychical researchers either. On the spiritualist side, Myers clearly saw this inclination of Wundt's and put it to good use in the *Introduction to the Phantasms*.<sup>171</sup> Myers started by acknowledging the indisputable reputation as an exact investigator of the human psyche that Wundt had won for himself: "Wundt stands, of course, among the foremost of those who have treated human thought and sensation as definite and measurable things, who have computed their rate of transit, and analysed their elements, and enounced the laws of their association" (Myers 1886: xli). With his emphasis on measurement, Wundt cannot be mistaken for a romantic or an enthusiast.<sup>172</sup> "But nevertheless" – Myers continued – "Wundt believes himself able to

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<sup>170</sup> "Wir befinden uns diesen Auserungen der Thierseele gegenüber in demselben Fall, in welchem wir uns bei der Untersuchung der unbewußten geistigen Vorgänge befunden haben. Auch dort sind uns nur die Resultate gegeben: wir müssen die Prozesse, die zu den Resultaten geführt haben, in die Sprache unseres eigenen Bewußtseins übersetzen." (Wundt 1862: 443).

<sup>171</sup> "Mr. Myers is solely responsible for the *Introduction*, and for the "Note on a Suggested Mode of Psychical Interaction," which immediately precedes the Supplement; and Mr. Gurney is solely responsible for the remainder of the book." (Gurney, Myers, and Podmore 1886: v). Podmore's name is included because of his collaboration to "the most difficult and important part of the undertaking - the collection, examination, and appraisal of evidence" (Ibid.).

<sup>172</sup> On the connections between general psychology and romanticism, especially the *Naturalphilosophie* of Schelling, see Schloegel and Schmidgen (2002: 620): "In 1833, for example, the Romantic naturalist Johann Bernhard Wilbrand claimed that "the first allusion to animal life lies in those simple animal molecules that are called infusion animals." Inspired by

assert that there is within us a residue – an all-important residue – of psychical action which is incommensurable with physiological law” (Myers 1886: xli). Myer went as far as quoting Wundt directly from his 1880-3 *Logik*, where Wundt states that “the physical organism [...], in all those purposive adjustments which distinguish it from inorganic compounds, is itself a psychical creation [eine geistige Schopfung]” (Wundt, *Logik*, v.2: 471; in Myers 1886: xlii. Myers’ translation).<sup>173</sup> That is to say, the purposive and adaptive movements of the organism, no matter how simple, can only be caused by a living psychical substance and cannot be explained as automatisms nor, at a smaller scale, as chemical reactions.<sup>174</sup> While Myers professed neutrality over the issue of vitalism (1886: xlii), he clearly used Wundt’s disposition to believe that physical forces are not enough to explain the behaviour of a living organism in support of his thesis that psychical forces exist and can operate through channels different from ordinary sense-perception.

As mentioned above, Peirce was unwilling to ground the actions of protoplasm either on a purely physical or on a psychical principle. After the 1890 “Logic and Spiritualism” article, Peirce’s problem was that of the connection between the two. Moreover, Peirce’s strategy in response to the spiritualist challenge to scientific knowledge had been chiefly that of a guarded criticism from the perspective of common sense: phenomena that went beyond the ordinary channels of perception flew in the face of ordinary experience and had therefore to be treated cautiously. However, common sense also opened the door to the recognition of a much more extended field of action for psychical phenomena, which would characterise the behaviour of animals as simple as amoebas.

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the natural philosophy of Friedrich Schelling, Wilbrand aimed to establish a unifying science, under the name of “general physiology,” in which comparison of the vital activities of plants and animals would make possible the discovery of the “essence of life.” [...] Wilbrand’s friend and colleague Lorenz Oken believed similarly that the study of infusoria was fundamental to an understanding of the unity of life.”

<sup>173</sup> “Nicht das geistige Leben ist ein Erzeugniss der physischen Organisation, sondern diese ist in allem, was sie an zweckvollen Einrichtungen der Selbstregulirung und der Energie-verwerthung vor den Substanzcomplexen der unorganischen Natur voraushat, eine geistige Schopfung.” (Wundt, *Logik*, v.2: 471).

<sup>174</sup> On the materialist side of this debate see Geison (1969).

Eventually, Peirce's metaphysical position can be described as oscillating between objective idealism and a psycho-physical parallelism reminiscent of Fechner. If matter is often described as mind hardened into habit, which lets us think that mind is the primary force constituting the universe, Peirce also insisted on the intrinsically spatial character of feeling, which effectively equates it to irritation. Irritation is not just a feeling occurring in a body, but a specific physical state of the body – a state of disarray, painful or annoying, from which the organism wants to escape.

The parallelism between mind and body is apparent particularly in two papers of the *Monist* metaphysical series, "Law of Mind" and "Men's Glassy Essence." As mentioned above, "Men's Glassy Essence" focuses explicitly on the relation between molecular and psychical activity in protoplasm. Peirce too referred to "Fechner's monograph" (W8: 165) when starting to expound his "molecular theory of protoplasm" (W8: 165) and to analyse its atomic components. However analysed, the relation between molecules and feelings remained problematic and no "first" could be attributed to one side or the other. In "Men's Glassy Essence" (1892), Peirce articulated the difficulty of keeping psychical and physical phenomena together but distinct as two faces of the same coin:

But what is to be said of the property of feeling? If consciousness belongs to all protoplasm, by what mechanical constitution is this to be accounted for? The slime is nothing but a chemical compound. There is no inherent impossibility in its being formed synthetically in the laboratory, out of its chemical elements; and if it were so made, it would present all the characters of natural protoplasm. No doubt, then, it would feel. [...] unless we are to accept a weak dualism, the property must be shown to arise from some peculiarity of the mechanical system. Yet the attempts to deduce it [i.e. feeling] from the three laws of mechanics [...] would obviously be futile. It can never be explained, unless we admit that physical events are but degraded or undeveloped forms of psychical events. (W8: 179-80).

The difficulty of resolving the relation between mind and matter, i.e. the psychical and the physical, lies in the fact that both physical and psychical elements have a crucial role in the "growth" of organisms as well as of the whole universe. This admittedly peculiar metaphysical position enables Peirce to support the notion (already introduced

with his 1885 experiment with Jastrow; see Ch. 4) that there is a “deeper ground of common feeling” (W6: 384) uniting individuals with each other and with the rest of nature.

In the “Law of Mind,” after having attributed spatial extension to feelings, Peirce analyses their logic along the same lines in which he analysed, in his papers on men’s faculties of 1868, the (mostly unconscious) activity of perception (see Chapter 2). This time, deduction, induction and hypothesis form the logical principles of his evolutionary metaphysics:

Thus, by induction, a number of sensations followed by one reaction become united under one general idea followed by the same reaction; while by the hypothetic process, a number of reactions called for by one occasion get united in a general idea which is called out by the same occasion. By deduction, the habit fulfils its function of calling out certain reactions on certain occasions. (W8: 152).

Besides attributing to the laws of feeling’s association the same logical laws that guide the processes of perception, Peirce argues, on the basis of the spatial and material reality of feeling, for the possibility of an explanation of mental communication along the same lines. This possibility constitutes Peirce’s alternative to the hypothesis of Gurney, Myers’ and Podmore that telepathy is mental communication along lines completely different from those of ordinary perception. Towards the conclusion of the “Law of Mind,” Peirce notes:

The psychological phenomena of intercommunication between two minds have been unfortunately little studied. So that it is impossible to say, for certain, whether they are favorable to this theory or not. But the very extraordinary insight which some persons are able to gain of others from indications so slight that it is difficult to ascertain what they are, is certainly rendered more comprehensible by the view here taken. (W8: 156).

The view taken in “Law of Mind” is that of a continuity between feeling, which is at bottom maintained in spite of feeling’s specialization and differentiation in “personalities.” Peirce’s emphasis on the possibility of explaining “insight” is an implicit invitation to shift the focus of psychical research from the rare and strange telepathic

phenomena to the marvellous enough of ordinary communication. This conclusion is strikingly similar to that of Peirce's 1885 paper "On Small Differences of Sensations": there too Peirce stated that the result of his study had "highly important practical bearings, since it gives new reason for believing that we gather what is passing in one another's minds in large measure from sensations so faint that we are not fairly aware of having them" (W5: 135). Peirce further suggested that "The insight of females as well as certain 'telepathic' phenomena may be explained in this way" (W5: 135); the scare-quotes around the name "telepathic" hint at Peirce's hope that such phenomena may be reclassified as special cases of insight.

In "Men's Glassy Essence," after reiterating that the purpose of his study is to elucidate the "relation between the psychical and physical aspects of a substance" (W8: 165), Peirce describes the growth of personality out of habit formation and the coordination of feelings. In this peculiar model, "a person is only a particular kind of general idea" (W8: 182). Thus, the definition of person is not bound to the narrow limits of an individual. Corporations, associations, governments are all instances of persons, whose "minds" however remain obscure to their members: "None of us can fully realize what the minds of corporations are, any more than one of my brain-cells can know what the whole brain is thinking" (W8: 182). These phenomena, Peirce maintains, would provide an excellent object of inquiry for anyone interested in psychical research, with the advantage of being subjectable to test:

All that is necessary, upon this theory, to the existence of a person is that the feelings out of which he is constructed should be in close enough connection to influence one another. Here we can draw a consequence which it may be possible to submit to experimental test. Namely, if this be the case, there should be something like personal consciousness in bodies of men who are in intimate and intensely sympathetic communion. [...] Would not the societies for psychical research be more likely to break through the clouds, in seeking evidences of such corporate personality, than in seeking evidences of telepathy, which, upon the same theory, should be a far weaker phenomenon? (W8: 182-3).

Common sense made Peirce recognise the need for a psychical explanation of life, however the same common sense requires Peirce to make psychical life, in all its forms,

open to inquiry through the channel of ordinary experience. A possible explanation of spiritualism and in particular of telepathic phenomena lies for Peirce in the similarity and perhaps partial overlapping of feelings constituting neighbouring personalities.

The main strategy for Peirce's response to Gurney, Myers and Podmore in the years 1866-92 was the defence of the reasons of common sense against any kind of special events which proclaimed to transcend ordinary experience. However, Gurney et al. did not neglect common-sense entirely: in fact, their strategy was that of making their argument acceptable to common-sense through a careful, case-by-case evaluation of testimony and through a statistical argument for the likelihood of experiencing a supernatural phenomenon. In the next chapter, Peirce's response to the case of spiritualism will reach a new depth, as Peirce realises that adherence to common experience is not enough to counter an idea of science based on special facts. In the "Telepathy" MS, Peirce's work will consist mostly in unpacking "common feeling" and showing the underlying continuity of what may seem the most individual of our activities, namely perception.

## Conclusion

Peirce's involvement with psychology did not stop with the 1885 publication "On Small Differences of Sensation," although it took a different course from that of experimental psychology. This chapter allows us to chart the further development of Peirce's philosophy in critical dialogue with two other important traditions of nineteenth-century psychology, namely psychical research or "spiritualism" and general or physiological psychology. The discussion of spiritualism brought important notions of evidence and scientific authority into the picture, allowing me to discuss the way in which epistemic and moral values were interlocked in the overall reception of scientific research.

Further, both the controversy surrounding spiritualism and the debate over the mechanical vs psychical origin of life shed new light on Peirce's position on the relation between scientific knowledge and common-sense. Contrary to William James, who believed that interest in strange and uncommon facts was the trademark of the true scientist, Peirce adopted an Aristotelian and scholastic perspective in defending the rights of ordinary knowledge over what is "isolated and strange." Thus, while he may approve of Gurney, Myers and Podmore's attempt at a systematic survey of telepathic facts, Peirce

is frustrated by their strategy of placing those phenomena by definition outside of the domain of ordinary sense perception.

Peirce's strand of vitalism – his notion that “protoplasm feels” – expresses the “common-sensical” position that a living organism cannot be reduced to a very complex machine. While being against such a reduction, Peirce did not renounce the investigation of the material component of protoplasm in their own terms, i.e. as molecular and atomic structures governed by electrochemical forces. The problem guiding the philosophical formulation of his evolutionary metaphysics is that of the *relation* between body and mind, matter and psychical force. Eventually, the “law of mind” – the principles of continuity, growth, habit-taking by progressive coordination of feeling – seems to be able to explain also the original formation of the states of matter that we encounter today: for this reason, Peirce's evolutionarily metaphysics can be seen as an attempt to balance objective idealism and a psycho-physical parallelism reminiscent of Fechner (see Ch. 3, 4).

As mentioned, Peirce's approach to both spiritualism and protoplasm theory in the years 1886-1893 focused mostly on showing that kinds of communication or insight apparently out of the ordinary were in fact instances of common experience. Thus, Peirce's account of personality in his “Law of Mind” and “Men's Glassy Essence” aimed at showing the continuity between each individual and lower as well as higher forms of psychical organization. Peirce's metaphysical work can therefore be understood also as a philosophical project to re-define and reclaim everyday experience. While this involved an analysis of how it came about from the progressive organization of feelings into habits, the cosmological and evolutionary focus did not allow a thorough investigation of the process of perception in this new context. Feelings and habits are analysed from the external point of view of the cosmologist or biologist, while their value as contents of consciousness and cognitive structures is left unexplored.

In the next and last chapter, I turn to Peirce's systematic treatment of perception in the 1902 MS “Telepathy.” While constituting Peirce's final answer to the questions raised by psychical research, it also allows to connect once more Peirce's logic of science and his philosophical theory of perception with his metaphysics of continuity.



# Chapter 6. Telepathy and Peirce's Metaphysics of Continuity

[**Philalete**]: J'ai dit [...] qu'il n'y a que deux sortes d'actions dont nous avons quelque idée, savoir le mouvement et la pensée. [**Theophile**]: Je croirois qu'on pourroit se servir d'un mot plus général, que de celui de *pensée*, savoir celui de *perception*...  
Leibniz, Nouveaux Essais sur l'entendement humain, II, xxi, § 72, 210 [507].<sup>175</sup>

## Introduction

The question of whether judgement has to be understood as part and parcel of perception (Helmholtz's account) or as radically different from perception (Kant's account) contributed to the definition of different philosophical positions and stimulated a re-thinking of the meaning of perception and judgement and of their possible interaction.<sup>176</sup> This chapter explores the interrelation of perception and judgement in Peirce's manuscript *Telepathy* (1902) and in his engagement with James' notion of stream of consciousness.

Peirce's discussion of perception in *Telepathy* originates in the context of spiritualist and psychical research broached in the previous chapter. Peirce referred explicitly to his controversy with Gurney in the course of *Telepathy* (CP 7.612) and used the debate on the opportunity for a scientist to study telepathic phenomena as the background to his unfolding reflections (CP 7.597; see Chapter 5). Against both Gurney's definition of telepathy and the authority of specialised knowledge, Peirce had defended the right of common sense to contribute to inquiry. For example, if specialised knowledge wanted to treat all life processes as mechanistic, common sense opposed the recognition that every organic being also possessed a psychical component and therefore a certain degree of purposefulness and freedom.

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<sup>175</sup> "I said ... that there is only two kinds of action of which we have any idea, namely movement and thought." "I would say that one could use a more general term than 'thought', namely, 'perception'...". Translation mine.

<sup>176</sup> As illustrated in Chapter 3.

In *Telepathy*, Peirce realised that his strategy was missing the point: Gurney et al. also valued common sense and directed their efforts into turning remote and obscure psychical phenomena into public phenomena, through the collection and laborious cross-checking of testimonies contained in their book *Phantasms of the Living* (1886). The apparitions or kinds of communication from mind to mind characterised as “telepathic” were grouped together and statistically assessed as any kind of physical, or common-sensical, fact. What Gurney et al. wanted to retain was not their remoteness from common-sense experience, but rather the understanding of telepathic communication and apparitions as happening through channels radically beyond those of ordinary perception. A decisive criticism of this position required bringing perception itself under examination.

Indeed, the relevance of the MS *Telepathy* for Peirce’s mature account of perception has been recognised since Arthur W. Burks’s 1958 edition of the manuscript, which bears the editorial title of “Telepathy and Perception” (CP 7.597). My claim is that *Telepathy* also needs to be read as a contribution to Peirce’s epistemology built upon his metaphysics of continuity. In the conclusion of his 1885 paper “On Small Differences of Sensation,” Peirce postulated the existence of “sensations so faint” that would explain how “we gather what is passing in one’s another mind,” “the insight of female as well as certain ‘telepathic’ phenomena” (W5: 135). In *Telepathy*, Peirce offered a philosophical analysis of perception; the possibility of these faint sensations and their communication however relied on a thorough account of continuity.

This claim is articulated in three Sections. Section 6.1 illustrates Peirce’s metaphysics of continuity, as developed in some key writings of the 1890s and puts it in relation with the inferential account of perception. Section 6.2 reconstructs Peirce’s mature account of perception in the *Telepathy* manuscript, its relation to James’ notion of stream of consciousness, and its role in reconducting psychical phenomena to the common-sense world of psychical phenomena. Finally, section 6.3 introduces *time* to answer to the question – formulated in Chapter 5 – of the status of telepathic phenomena in relation to other scientific facts.

## 6.1 Peirce’s Metaphysics of Continuity: Synechism

Peirce based his account of perception on a metaphysical theory of continuity. As he wrote in the short article (never published during his lifetime) “Immortality in the Light

of Synechism” (1893), “[a]ll communication from mind to mind is through continuity of being” (EP2: 3). Peirce introduced the term “synechism” the year before, in the 1892 paper “The Law of Mind;” he explained it as “[t]he tendency to regard continuity, in the sense in which I shall define it, as an idea of prime importance in philosophy” (W8: 136). The proper definition of continuity is indeed one of the main issues of Peircean scholarship. In the following, I give an account of from the perspective of his theory of perception.

Recent investigations of Peirce’s theory of continuity have privileged its mathematical aspects: Peirce tried different mathematical descriptions of the continuum, engaging with Cantor but also with Aristotelian and Kantian theories. Giovanni Maddalena (2009), Matthew E. Moore (2007), Hilary Putnam (1992) all insist on the necessity to interpret Peirce’s theory of continuity in light of his mathematics. Putnam, who indeed provided one of the richest analyses of Peirce’s mathematical continuum, went so far as to propose to change the title of Peirce’s Cambridge Lectures of 1898 from “Reasoning and the Logic of Things” (RLT) to “The Consequences of Mathematics” (Putnam 1992: 1).

Indeed, Peirce gained much confidence in his metaphysics of continuity from his ability to engage mathematically and topologically with the notion of continuous space. However, his reasons for elaborating such a peculiar metaphysics of continuity reached beyond mathematics. Matthew E. Moore maintains that the mathematical account is motivated by philosophy: “around the mid-1890s the Peircean continuum came into being; for it was not until then that Peirce hit upon a mathematical analysis of continuity that *matched up* with the philosophical motivations of his continuum” (Moore 2007: 425. Emphasis added). The philosophical motivations of Peirce’s continuum have been sought so far in the influence of other philosophers, most notably Leibniz, and in Peirce’s semiotics (Bellucci 2013; Fabbrichesi 2005; Fisch 1972/1986).

Building on this research, my purpose here is to highlight Peirce’s philosophical motivations for continuity in relation to scientific practice – particularly, in relation to his engagement with experimental psychology and telepathy. Peircean scholars generally overlooked the role of experimental and evolutionary psychology in the development of Peirce’s continuum in favour of mathematics, logic and semiotics. These were perceived as anchors holding Peirce’s theory from sliding into a strange, outdated metaphysics (Fabbrichesi 2005: 18). In the following, I focus on those aspects of the metaphysics of

continuity which are more relevant to understand Peirce's integration of telepathy within perception and his more general epistemological position concerning the integration of perception and reasoning.

Peirce highlighted the connection between his mature theory of continuity and his early papers on cognitions, published in 1868 in the *Journal of Speculative Philosophy* (illustrated in Chapter 2):

The present paper is intended chiefly to show what synechism is, and what it leads to. I attempted, a good many years ago, to develop this doctrine in the *Journal of Speculative Philosophy* (Vol. II); but I am able now to improve upon that exposition, in which I was a little blinded by nominalistic prepossessions. I refer to it, because students may possibly find that some points not sufficiently explained in the present paper are cleared up in those earlier ones. (W8: 136. Emphasis added).

Peirce considered his 1892 exposition an improvement chiefly because it moved away from the “nominalistic prepossessions” (W8: 136), i.e. nominalistic prejudice, of his early formulation. As I illustrate in section 6.2, Peirce's analysis of perception in *Telepathy* endeavours to accommodate *both* the immediate, purely present “fact” of perception and the mediate, representational “judgement” over it.<sup>177</sup> In this section, I illustrate the metaphysical theory of continuity which, by Peirce's own admission, constitutes the foil of his theory of perception.

If we take Peirce's declaration seriously, Peirce's philosophical account of continuity rested on a theory of knowledge and a theory of perception dating back to 1868. In his 1868 essays, he insisted on the absence of a “first” moment or “ground” for cognition, making it instead rest on testimony at the level of the self and on scientific method at the level of society (see Chapter 2). In his 1885 psychology experiment with Jastrow, Peirce defended a theory of perception as continuous and inferential against Fechner's notion of a threshold [Schwelle] of perception (see Chapter 4). Finally, in the 1893 unpublished paper “Immortality in the Light of Synechism,” Peirce brought metaphysical considerations regarding continuity fully into the picture. There, Peirce used

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<sup>177</sup> See Bergman (2007) for a thorough account of “representationalism” and “presentationalism” in Peirce's theory of perception.

his “continuity of being” to blur one of the most ancient distinctions of Western philosophy, the distinction between being and not being:

There is a famous saying of Parmenides, ἔστι γὰρ εἶναι μηδὲν δ'οὐκ ἔστιν [ésti gar einai medèn d'ouk éstin], “being is, and not-being is nothing.” This sounds plausible; yet synechism flatly denies it, declaring that being is a matter of more and less, so as to merge insensibly into nothing. (EP2: 2).

The criticism against Parmenides’ metaphysics of discontinuity was coupled with praise of “a Brahmanical hymn” from the beginning of *The Metaphysics of the Upanishad, or Vichar Sagar*:<sup>178</sup> “I am that pure and infinite Self, [...] who am the substrate of all that owns name and form” (EP2: 3). Like many other post-Kantians, Peirce found in Indian philosophy an alternative to Parmenides and to the traditional Western two-values metaphysics that Parmenides embodied.<sup>179</sup> Significantly, Peirce brought the Brahmanical notion of continuity immediately to bear on the notions of individuality, which Peirce had tried to remove from its privileged epistemic position since 1868 (as illustrated in Chapter 2) and again, with the backup of scientific psychology, in 1885 (Chapter 4). In the 1893 paper draft, Peirce took the Brahmanical hymn to indicate “still another direction in which the barbaric [i.e., Western] conception of personal identity must be broadened” (EP2: 3).

The first direction in which Peirce expanded personal identity was that of interpersonal boundaries. Peirce rejected the metaphysical reality of the isolated self, acknowledging instead that what we identify as “self” is mobile, plastic, and to some extent overlapping with other selves: “Nor must the synechist say, ‘I am altogether myself, and not at all you.’ If you embrace synechism, you must abjure this metaphysics of wickedness” (EP2: 2). Secondly, the conception of personal identity had to be broadened in order to include mind to mind communication; continuity between phenomena; life-to-death continuity: “Synechism refuses to believe that when death comes, even the carnal consciousness ceases quickly” (EP2: 3); continuity of consciousness beyond the individual’s physical reality – including e.g. “the social consciousness, by which a man’s spirit is embodied in others, and which continues to live and breathe and have its being very much longer than superficial observers think” (EP2:

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<sup>178</sup> EP2: 503, sec.1, n. 5.

<sup>179</sup> For instance, Indian philosophy was an important influence also on Fechner (see Ch. 3).

3). The relevance of Peirce's metaphysics of continuity for the assessment of telepathic phenomena is thus clear. Continuity of being would enable, for Peirce, a continuity between mind and mind as well as between life and death, being and not being; telepathic phenomena could thus be conceived (and brought to test) as a combination of mind to mind and life-to-death, death-to-life communication.

The potential that synechism displays to accommodate a variety of phenomena as different degrees of the same underlying process is conditional on showing that those phenomena actually belong to the same universe; in other words, for Peirce a metaphysical account is necessary to bring all phenomena within the same frame of reference. In the case of telepathic phenomena, for instance, if, following Gurney, Myers and Podmore's definition, they are understood as "All transmissions of thought and feeling from one person to another, by *other means* than through the recognised channels of sense" (Gurney, Myers and Podmore 1886, v.1: vi; emphasis added), then telepathic communication no longer belong to the same universe, metaphysically speaking. Their discontinuity with the present conditions of experience would make them absolutely incognizable. If instead telepathic phenomena are reconducted to the process of ordinary perception, as Peirce's argument in *Telepathy* goes, then they could profitably be investigated with ordinary (scientific) means. Thus, the validation of telepathic inquiry and the validation of continuity are deeply connected.

Peirce's metaphysical notion of continuity is also connected with his account of perception as unconscious inference. In 1891, a year before "The Law of Mind" paper, Peirce's review of James' *Principles of Psychology* appeared anonymously in *The Nation*. The review focused on the theory of unconscious inference in perception, which James rejected; Peirce's whole review is an analysis and refutation of James' argument against unconscious inferences. Unconscious inferences are for Peirce inferences in which one is unconscious of the process occurring to bring about the conclusion. The conclusion is, logically, the result of an inference, although psychologically it is experienced as immediate. Philosophically, unconscious inferences fit nicely within the Leibnizian metaphysics of continuity in which perception and judgement merge into each other. In defending the notion of unconscious inferences in psychology, Peirce's claim was that assimilating perception, however partially, to reasoning was the only way to make perception intelligible:

... *the process of perception is one of reasoning in a generalised sense of that term.* [...] This, of itself, would not make the inference unconscious. But it is so because it is not recognised as an inference; the conclusion is accepted without our knowing how. *In perception, the conclusion has the peculiarity of not being abstractly thought, but actually seen,* so that it is not exactly a judgement though it is tantamount to one. The advantage of this method of explaining the process [of perception] is conceived to be this: To explain any process not understood is simply to show that it is a special case of a wider description of process which is more intelligible. (Peirce 1891: 32; emphasis added).

Peirce was applying in defence of the interpretation of perception as unconscious inference the same argument that he would later employ for bringing telepathic phenomena within ordinary perception: in order to explain something, we have to be able to see it in terms of something else which is already known. This, for Peirce, is the very definition of what “explanation” amounts to. If this line of reasoning is applied the case of psychological phenomena, one can say that telepathy is a special case of ordinary perception as much as perception is a special case of inference. However, the argument of *Telepathy* goes beyond this line of reasoning by committing to the other side of the equation too. While up to now Peirce explained perception as a special case of reasoning, in *Telepathy* Peirce emphasised the *perceptual elements* which are present in reasoning. In a sense, the bridge between perception and reasoning is truly continuous only if it can be crossed in both directions.

## 6.2 Ordinary perception and “radical empiricism:” *Telepathy* (c.1903)

In his 1887 review of Gurney, Myers and Podmore’s *Phantasms*, Peirce criticised a number of reported apparitions or telepathic phenomena, arguing that, for various reasons, they should not be counted among genuine cases of telepathy. However, he did not appear dismissive of the whole research program. As Gurney recognised in his reply to Peirce, through his detailed criticism of specific cases Peirce was showing that he was not discounting telepathic phenomena prejudicially. What perhaps Peirce failed to convey – or Gurney himself did not want to understand – was that the problem for Peirce lay not

so much with accepting the phenomenal reality of the apparitions, but with the idea that they belonged to a completely different domain than that of ordinary perception, as Gurney, Myers and Podmore's definition stipulated. In his 1902 MS *Telepathy*, Peirce came back to the old debate with Gurney, this time endeavouring to spell out his point more clearly:

If there were only some way of reconciling the usual order of nature, as it is familiar to us, with the possibility of rare cases of quasi-vision beyond the ken of sense, then I grant that the testimonies adduced in "Phantasms of the Living" would suffice to render it extremely likely that such rare quasi-vision actually takes place. (CP 7.615).

For Peirce the problem in accepting telepathic phenomena did not come from the apparent strangeness of their manifestations but from the absolute inexplicability (in Peirce's perspective) of the cause adduced for them. The *Telepathy* MS constitutes Peirce's attempt at showing that telepathic phenomena can, in principle, be brought within "the usual order of nature." Peirce rhetorically asked: "Is it quite certain that such an occasional, but very rare, determinedly veridical vision of things beyond the senses' ken would be altogether unlike every-day experience?" (CP 7.616). To determine this issue, he had to analyse the building blocks of every-day experience: ordinary perception. Again, Peirce spelled out his intention with a question: "Only, the question arises, What do we perceive?" (CP 7.618). The answer could come only from a careful analysis of perception.

Peirce individuated three fundamental elements of perception: the *percept*, the *perceptual judgement*, and the *percipuum*. The percept denotes what is perceived (*res percepta*), meaning thereby the *content of perception*; the perceptual judgement constitutes the first interpretation of the percept, and the percipuum designates perception when the percept and the perceptual judgement are taken together.<sup>180</sup> As Peirce remarked,

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<sup>180</sup> For an account of the phenomenological and logical aspects of experience in Peirce, see Atkins (2018). Atkins' is the first study which exclusively focuses on Peirce's phenomenology, equally contributing to contemporary debates and to Peirce scholarship. See esp. his Ch. 5, "Phenomenological Investigation." For studies on the relation of Peirce's thought to Husserl's, see Spiegelberg (1956), Rosensohn (1974), Rosenthal (1980), Dougherty (1980), Houser (1989), Haaparanta (2002), Stjernfelt (2007, pt. 1), Luisi (2009), and de Waal (2015). For a more general



even if among psychologists the term “percept” was usually explained with the term “image,” this was an unfortunate move, since “image” suggests a representation. Peirce’s account of perception in *Telepathy* crucially depends on the role and space assigned to the percept, and on how the other different elements of perception (especially the perceptual judgement) come to terms with it. The character of the percept consists precisely in its *not* containing any representational element. In fact, the percept simply *presents* itself:

It is a forceful thing. Yet it offers no reason, defence, nor excuse for its presence. It does not pretend to any right to be there. It silently forces itself upon me. Such is the percept. (CP 7.621-2).

The “forceful” imposition of the percept upon the conscience of the perceiver means that the percept cannot be ignored at will: it “compels the perceiver to acknowledge it” (CP 7.622). The lack of “reason, defence, [or] excuse” of the percept’s simple presence points to another striking character of the percept: its being “absolutely dumb” (CP 7.622). The percept does not need to argue to make its way in consciousness, in fact it wouldn’t be a percept if it did. The percept is the simple content of consciousness, crucially (if rather crudely) contributing “something positive” (CP 7.622) to our knowledge. The percept can be seen as perception in its purest form: this is what describing it as “absolutely dumb” ultimately means.

Other forms of cognition can “partake of the character of perception,” i.e. have some degrees of dumbness to them and appear to compel us, with varying strength, to accept their content as a simple fact: “There will be a wider genus of things *partaking* of the character of perception, if there be any matter of cognition which exerts a force upon us *tending* to make us acknowledge it without any *adequate* reason” (CP 7.623; emphasis

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study of pragmatism in relation to the phenomenological tradition, see Rosenthal and Bourgeois (1980). For a critique of the compatibility of pragmatism with phenomenology, see Aikin (2006). In the present chapter, I do not engage with Peirce’s phenomenology: my aim is instead to uncover the epistemological and metaphysical elements underlying Peirce’s mature account of perception, analysed from a history of philosophy of science perspective. Phenomenology, which only appears as an explicit concern of Peirce’s in 1902, remains a crucial part of the *logical* analysis of the content of perception.

of the text). This “wider genus of things” was constituted, in perception, by perceptual judgement, and included things such as mathematical demonstrations:

This indefensible compulsiveness of the perceptual judgment is precisely what constitutes the cogency of mathematical demonstration. One may be surprised that I should pigeon-hole mathematical demonstration with things unreasonably compulsory. But it is the truth that the nodus of any mathematical proof consists precisely in a judgment in every respect similar to the perceptual judgment except only that instead of referring to a percept forced upon our perception, it refers to an imagination of our creation. (CP 7.659).

The perceptual judgement is Peirce’s way to introduce generality in perception while retaining as much as possible the necessity and constraint of the percept. As Hoel puts it, “the perceptual judgement undermines the singularity of the percept by introducing a productive vagueness that allows a certain freedom or leeway for interpretation on the side of the perceiver” (Hoel 2012: 259). If the percept is the content of our consciousness in its simple manifestation, the perceptual judgement is the first step of a reflexive apprehension of it. This happens with equal force regardless of the fact that the content of our consciousness is an object of the physical world or a mathematical object. Thus, the perceptual judgement is the moment when the dumb presence of an object in one’s consciousness is recognised *as* something – to use another of Peirce’s examples, *as* a yellow chair. The percept forces the yellow chair on us but does not include the reflexive act of recognition and apprehension of it *as* a yellow chair. This is something that the perceptual judgement delivers. Although the perceptual judgement imitates the percept in its forceful insistence on consciousness, the perceptual judgement’s strength is not “absolute:”

The forcefulness of the perceptual judgement falls short of the pure unreasonableness of the percept only to this extent, that it does profess to represent the percept, while the perfection of the percept’s surdity consists in its not so much as professing anything. (CP 7.628).

The perceptual judgement testifies about the percept and gives it a name; it thus introduces in perception an element of mediation. Since the perceptual judgement is an

interpretation (albeit compelled) of the percept, it goes beyond the pure singularity of the percept. Thus, Peirce could claim that generality is an integral part of perception. To see how, let us consider a series of percepts. Since each percept is “absolutely dumb” and singular, they are disconnected from each other (7.633). The perceptual judgement which follows suit reconnects different percepts – the yellow chair seen from the staircase or from across the table, the yellow chair of one minute before and the one I am expecting to see if turn my eyes to it – *as* “the yellow chair.” As Peirce puts it:

The perceptual judgment ‘this chair appears yellow’ has vaguely in mind a whole lot of other things, *of which some have been seen and no end of others may be or might be seen*; and what it means to say is, ‘Take any yellow thing you like, and you will find, on comparing it with this chair, that they agree pretty well in color.’ It thus directly invites the exercise of a freedom of choice on the part of the interpreter [...], which freedom the percept simply and stupidly precludes. (CP 7.632; emphasis added).

Importantly, the generality of the perceptual judgement is not only a sum of all actual instances of yellow things, but also “what *would be* and what *could be* the case” (Putnam 1992: 77). The perceptual judgement, being an interpretation of the percept, already contains elements of generality, so that for Peirce generality is embedded in the very structure of perception. Together with generality comes an element of freedom, which is the freedom of every interpretation in deciding what to include under their description. While making interpretation, generality and freedom constitutive elements of perception is an extraordinary move, it has to be qualified. As Thomas L. Short puts it, paraphrasing Peirce: “One does not choose what he sees when he looks, even if what he sees is what he has chosen to look for and even if he would not see it if he were not looking for it” (Short 2015: 2; CP 7.625: “If one *sees*, one cannot avoid the percept; if one *looks*, one cannot avoid the perceptual judgement”).

The element of compulsion present in the perceptual judgement is so strong that Peirce classifies the perceptual judgement rather with perception proper than with judgement: perceptual judgements are not judgements from a logical perspective. Nonetheless, Peirce observes that “proper” judgements force themselves upon our mind with the same feeling of inevitability and independence from what our wishes may be. As mentioned before, there is a perceptual element in the way in which conclusions from

reasoning processes – including from logical or mathematical reasonings – strike our consciousness, although their being in consciousness is not as unreasonable and “dumb” as a percept or perceptual judgement would be.

The last of the three fundamental elements of perception is the percipuum. Peirce uses “percipuum” as a synonym of “perception” when percept and perceptual judgement are not distinguished (7.629). The consequences of being able to consider percept and perceptual judgement together are far-reaching. Namely, if this integration is successful, it would mean that Peirce managed to bring the presentational and the representational elements of perception together, and that absolute singularity and generality go hand in hand in perception. Peirce was proposing not only a new framework in which to consider perception – a framework in which telepathic phenomena can be included in perception, even if at its borders – but also a new kind of empiricism.

At the beginning of the *Telepathy MS.*, Peirce declared himself a “radical empiricist” (CP 7.617), a definition which needs qualification in light of his theory of perception and of his relation with James. Peirce wrote:

But I myself happen, in common with a small but select circle, to be a pragmatist, or “radical empiricist,” and as such, do not believe in anything that I do not (as I think) perceive: and I am far from believing in the whole of that. (CP 7.617).

Peirce’s self-proclamation as a “radical empiricist” and “pragmatist” is undoubtedly provocative, since his own understanding of those labels was unique within his “small but selected circle.” It is useful here to briefly compare Peirce’s position on perception with James’. James’ definition of radical empiricism in his 1904 essay “A World of Pure Experience” had a distinctly nominalist flavour:

Empiricism is known as the opposite of rationalism. [...] Empiricism [...] lays the explanatory stress upon the part, the element, the individual, and treats the whole as a collection and the universal as an abstraction. [...] To be radical, [...] the relations that connect experiences must themselves be experienced relations, and any kind of relation experienced must be accounted as ‘real’ as anything else in the system.” (James 1912: 41-42; W2: 1160).

James stressed that relations were “real” and had to be part of a meaningful philosophical explanation; for him, the “radicalism” of his empiricism came from understanding relations as *just as real* as the (individual or collective) terms they connect; what James did not admit however was “rationalism,” i.e. the reality of generals. Peirce’s account of radical empiricism in contrast makes the “radical” move consist in accepting generality in and together with the singularity, as his analysis of perception showed. James’ nominalism however did not prevent from thinking the stream of consciousness as fundamentally continuous. In his 1884 paper “On Some Omissions of Introspective Psychology” and in the *Principles* alike, James complained that the introspective school of psychology failed to do justice to the experience of thought as a process and to the feeling of thought as such, bringing only its “substantive parts” (1884: 3) to the attention of the psychologist:

All dumb psychic states have, owing to this error, been coolly suppressed; or, if recognised at all, have been named after the substantive perception they led to, as thoughts “about” this object or “about” that [...]. ... *the worst consequence of this vicious mode of mangling thought’s stream is [that,] [f]rom the continuously flowing thing it is, it [thought] is changed into a “manifold,” broken into bits, called discrete [...].* (James 1884: 6; emphasis added).

In the *Principles*, the methodological error of the introspectionists – namely, taking for the whole of thought what in fact constitutes only a fraction of it – is explained on the grounds that thought cannot flow and observe itself flowing at the same time. The continuity of feeling of the stream of thought cannot but be broken by attempts at pinning it down with an observation. The stream of thought cannot be laid on a dissecting bed, the psychologist cannot “cut a thought across in the middle and get a look at its section” (PP1: 244): the operations of thought are such that any attempt at observing it immediately alters it. As highlighted by Girel (2003: 187-9), this is precisely where the differences between Peirce’s logical analysis of thought and James’ psychological approach emerge most strikingly.

While James was worried that any attempt at introspectively capturing the flow of thought would compromise its psychological reality, making the process of thought appear as equal to the series of the objects occupying it, Peirce would worry that

introspection alters or obscures the *logical* relations between the different elements of thought. For Peirce, the analysis of perception is an analysis of its content and of its relations – precisely the cross-section of thought that James deemed impossible. In *Telepathy*, Peirce returned one last time on this point: such analysis is “the operation of abstraction,” (CP 7.665), which makes us look at what is transient (“transitive, transitory”) in a substantive way.

James suggested already in 1884 a distinction between the “substantive” elements of thought, i.e. those which are “about” objects and, in a sense, can become objectified in front of the eye of the introspective psychologist, and its “transitive” elements, i.e. the relations between those parts. For James however, both elements were “felt” by the flowing, continuous consciousness:

We ought to say a feeling of *and*, a feeling of *if*, a feeling of *but*, and a feeling of *by*, quite as readily as we say a feeling of *blue* or a feeling of *cold*. Yet we do not: so inveterate has our habit become of recognising the existence of the substantive parts alone... (James 1884: 5, emphasis of the text).

For Peirce instead, James’ terminology of “substantive” and “transitive” elements of thoughts had to be reconsidered in order to enable a logical analysis of the process of thought, which would be reconstructed in its operations without having them lose their peculiar *logical* quality. According to André de Tienne, from 1902 on Peirce recognised two ways to observe the phenomenal world (which he also called, in those years, “phaneron”). One involves a process of objectification and abstraction from the continuous stream of consciousness, and it appears mostly in Peirce’s analysis of James’ notion in the 1890s. The other one however resembles more closely the process of interpretation of the percept into the perceptual judgment analysed in *Telepathy*:

...it is the act through which the mind recognises the appearance of what appears, without any mediating representation. [...] We shall give to this kind of appearance the name of “lived phaneron.” (de Tienne 2000: 101).<sup>181</sup>

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<sup>181</sup> « La première [...] est l’acte par lequel l’esprit reconnaît la manifestation de ce qui apparaît sans aucune représentation médiatrice. [...] Donnons à ce type d’apparence le nom de *phanéron vécu*. » de Tienne 2000 : 101 ; Translation mine.

This, according to Peirce's model, is also what perception itself does when it elaborates sensory inputs into percepts for consciousness or when it interprets percepts in a perceptual judgement. I illustrate the possibility of the actual movement between the singularity of the percept and the general element introduced by the perceptual judgement in section 6.3, where a further notion – time – is crucial to build a real continuity in Peirce's account of perception. In the following, I show how Peirce used the notions of percept and perceptual judgement described above to make his case for considering telepathic phenomena within the domain of ordinary perception.

Peirce's strategy was to show, firstly, that the percept, in spite of its appearance as a dumb presence, is in fact the result of an unconscious process; secondly, that the reality of percept could be assessed by using the same methods detailed in his 1868 and 1877-8 essays to "fix" belief: by testimony and by scientific inquiry. Thus, Peirce's philosophical psychology and his epistemology are both involved in evaluating percepts, regardless of the world to which their objects belong (mathematical, physical, or psychical).

In his early essays on cognition and scientific method (the "Cognition" series, and the *Illustrations*) Peirce stressed that, since the process of building an object for consciousness is largely unconscious, its result appears to our consciousness as an immediate perception (as illustrated in Chapter 2). Peirce's point was to reconcile common-sense knowledge with scientific knowledge and to show that absolute foundations are neither necessary nor desirable features of knowledge. However, the percept of *Telepathy* appears at first as precisely that kind of foundational element – an "absolutely dumb" presence that just insists in being there. Peirce did not renounce his inferentialist account of how a percept comes about, even as he stressed its "presentational" role:<sup>182</sup>

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<sup>182</sup> Also from the point of view of an analysis of categories, Peirce analysed the percept in terms of the first two categories, "Firstness" and "Secondness," that is, the "qualities of feeling or sensation" which "contribute something positive" to perception (Firstness) and the "vividness" of the percept, which presupposes an "effect upon the perceiver" (Secondness) (CP 7.625). The last category, called "Thirdness," was connected to the perceptual judgement: "In a perceptual judgement the mind professes to tell the mind's future self what the character of the present percept is" (CP 7.630). See Bellucci (2018: 216-7) for an analysis of the categories in Peirce's

A visual percept obtrudes itself upon me in its entirety. I am not therein conscious of any mental process by which the image has been constructed. The psychologists, however, are able to give some account of the matter. *Since 1709*, they have been in possession of sufficient proof (as most of them agree,) that, notwithstanding its apparent primitiveness, every percept is the product of mental processes, or at all events of processes for all intents and purposes mental, except that we are not directly aware of them; and these are processes of no little complexity. (CP 7.624).

According to Peirce, it was Berkeley who firstly introduced the inferential account of perception and used it to support his broader epistemology. His essay on vision dates 1709, so Peirce's claim that psychologists possess "sufficient proof" of a mediated account of perception likely refers to Berkeley's account. Moreover, since 1871 Peirce recognised Berkeley's 1709 essay on vision as a theoretical forerunner of the modern psychology of Herman von Helmholtz (W2: 462ff; see Chapter 3). Peirce recognised that we are unable, in virtue of the percept's insistence alone, to know whether reality actually corresponds to the content of our perception.

In manuscript R 428, written slightly before *Telepathy* (c.1902), Peirce elaborated a three-steps method to assess the reality content of percepts. The reason why I refer to this manuscript rather than to *Telepathy* is that in R 428 Peirce's test for the reality of the percept features ghosts as an example of potential collective hallucination: this testifies for the pervasiveness of Peirce's preoccupation with Gurney, Myers and Podmore's essay and shows his strategy of linking the deep interconnection between Peirce's account of perception and the question of whether supernatural problems can be investigated scientifically.

In R 428, the first step to establish the reality content of a percept consists in trying to dismiss it: "A fancy, or day-dream, can commonly be dismissed by a direct effort of will" (CP 2.142). Being unable to do so, one is usually satisfied of its reality. Still, if doubt remains, one can ask someone else for confirmation (What do you see here? Why, the yellow chair). The second step of the verification process thus consists in the testimony of others. There can however be cases in which a whole group of people is

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1903 *Syllabus of Certain Topics of Logic*, which is contemporary or immediately preceding *Telepathy*.



affected by an hallucination. The third step of verification of a percept is therefore the test of science – a test that, Peirce claimed, “is [by] far the surest of the three” (CP 2.142). Peirce wrote:

Namely, I may make use of my knowledge of the laws of nature (very fallible knowledge, confessedly) to predict that if my percept has its cause in the real world, a certain experiment must have a certain result – a result which in the absence of that cause would be not a little surprising. I apply this test of experiment. If the result does not occur my percept is illusory; if it does, it receives strong confirmation. *For example, if I and all the company are so excited that we think we see a ghost, I can try what an unimaginative kodak would say to it.* (CP 2.142. Emphasis added).

To be precise, “I see a ghost” is a perceptual judgement, i.e. an interpreted percept. Peirce is using here “percept” in the wider sense of “content of perception.” The ultimate verdict of the kodak would be on the whole of the perceptual process – what Peirce in *Telepathy* termed “percipuum.” However, Peirce’s use of the term “percept” for the object of perception also stresses the strength and immediacy with which the object – in this case, a ghost – may force itself on consciousness. Peirce’s comment on the “unimaginative kodak” may have a pinch of sarcasm in it, however it is part of the same research agenda defended in his replies to Gurney: bringing telepathic phenomena back to ordinary experience (as discussed in Ch. 5).

Together with bringing his epistemology to bear on the issue of psychical phenomena, Peirce’s engagement with psychical phenomena fed back into his epistemology, especially for what concerns its notion of reality. In the cognition papers of 1868 and in the *Illustrations of the Logic of Science* of 1877-8, reality was what resists us and the final opinion which a community of investigators would eventually come to believe. In *Telepathy*, the resistance of the percept, taken by itself, is not a good enough mark of reality; however, both the testimony of others and the relation of the percept with other percepts (via the perceptual judgement) bear on its reality. All these elements concur in giving an organic account of perception in which telepathic phenomena can find a space.

As seen in section 6.1, Peirce opposed philosophical positions that may cleave metaphysical discontinuities, such as nominalism and dualism. In 1893, Peirce defined

“dualism [as] the philosophy which performs its analyses with an axe, leaving, as the ultimate elements, unrelated chunks of being...” (EP2: 2). When introducing the term “synechism” to emphasise the aspect of continuity in his metaphysics, Peirce also gave an etymology of his new term: “The Greek word means *continuity of parts brought about by surgery*” (EP2: 1, n.1; emphasis added). While the editors note that “Peirce’s surgical etymology does not appear prominently in Liddell and Scott’s *Greek-English Lexicon*” (EP2: 503, sec. 1, n. 1), it is possible that Peirce wanted thereby to emphasise the patching work that he believed his metaphysics would perform over Western metaphysics, which he would have seen as lying dismembered after a long tradition of dualism. The danger of being left with “unrelated chunks of being” is in fact common to all analysis. Peirce’s own analysis of perception could be accused of having dismembered an organic process in almost incompatible stages, i.e. the percept and the perceptual judgement. In the last section (6.3), I illustrate how Peirce managed to bring together the “unrelated chunks” of perception<sup>183</sup> and to solve the question he set forth with *Telepathy*.

### 6.3 The Continuity of Perception in Time

In the *Telepathy* paper, the metaphysics of continuity developed in the 1890s and illustrated in 6.1 had to be integrated with an account of perception as continuous. Such an account was indeed functional to addressing the scientific issue behind the paper itself: to show that telepathic phenomena could be considered border cases of ordinary perception. Peirce however was aware that he could have brought his point home just by insisting on the properties of the percept: its irrational, stubborn hold on consciousness as well as its influence on the perceptual judgement meant that a mistaken perceptual judgement (coming, for example, from an optical illusions) would convey the very same assurance of reality than ordinary perception (CP 7.658). In the same way, a telepathic perceptual judgement would have appeared to the perceiver just as real as any perceptual judgement. Nonetheless, Peirce felt the need to articulate his analysis of continuity in perception at a deeper, metaphysical level. The discussion around telepathy opened for

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<sup>183</sup> Robert Stern (2015) shows that, at a theoretical level, a Hegelian model succeeds in bringing coherence and support to Peirce’s metaphysics of continuity. However, Peirce believed – whether rightly or wrongly is beyond the scope of this chapter – that Hegelian metaphysics failed to give its due to the “outward clash,” i.e. the sheer power of the outer world to impose itself with its phenomena upon our consciousness.

Peirce the opportunity to present, although in a sketchy form, some of the most important tenets of his philosophy, and to show their interdependence. Peirce's commitment to a full metaphysical elucidation of continuity in perception testifies to the importance that he assigned to metaphysical explanations in his epistemology:

We must enter for a few moments into the field of metaphysics. For we are inquiring how things really are whatever we may think. What is reality? There would not be any such thing as truth unless there were something which is as it is independently of how we may think it to be. That is the reality, and we have to inquire what its nature is. (CP 7.659)

For Peirce the starting point of inquiry into reality is that original element of perception "which is as it is independently of how we may think it to be." Peirce recognised that this was his definition of "percept" as well as his definition of reality in the 1877-8 *Illustrations of the Logic of Science*. It is strikingly similar to Kant's notion of the "real in sensation" as "an empirical reality which cannot be changed at will" (Kraus 2013: 341-2), illustrated in Chapter 3. Again, as Anneliese Maier noted, for Kant "what can be subsumed under the category of reality can only be the content of sensation" (Maier 1930: 56). However, in *Telepathy* Peirce aimed to go beyond Kant's transcendental boundaries and to undertake a *metaphysical* – not purely transcendental – inquiry into reality. While he may have inherited from Kant the idea that such inquiry takes its lead from the material content of sensation, Peirce developed it in a direction that would have been unacceptable for Kant.

Peirce's ontological concerns resonate with Leibniz's, whose metaphysics was, too, centred around continuity, although a continuity which also admits individuality in the form of the monad (Crockett 1999). Peirce in fact claimed, in his 1892 "Law of Mind," to be pulling together Leibniz's and Aristotle's notions of continuity:

...I made a new definition, according to which continuity consists in Kanticity and Aristotelicity [sic.]. The Kanticity is having a point between any two points. The Aristotelicity is having every point that is a limit to an infinite series of points that belong to the system. (W8, 143-5).<sup>184</sup>

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<sup>184</sup> Incidentally, the "Aristotelicity" is also present in the early Leibniz's notion of continuity: see Crockett (1999: 119). See also Kant's definition of continuity in the *Anticipations*: "The property

As mentioned in 6.1, Peirce's notion of continuity gained in subtlety and depth from his engagement with mathematics, however it had its roots in his theory of perception and in his broader epistemology. In *Telepathy*, time is the dimension in which the results of mathematical analysis and his philosophical analysis of perception come together in an expanded notion of continuity. "Thus, that which the mathematicians call 'continuity' becomes, for me, 'pseudo-continuity'" declared Peirce (CP 7.652). Infinite divisibility without ultimate parts is one of the ways in which Peirce's continuum is expressed, and he used time as a bridge to apply the mathematical analysis of continuity to perception. Peirce maintained that time does not have ultimate instants: "every lapse of time [is] a lapse of time" (CP 7.651), i.e. one could be dividing a lapse of time infinite times and one would always obtain a lapse of time. Both percepts and perceptual judgements happen in time; thus, also in the case of perception it is impossible to pin down a section which cannot be further analysed in percept and perceptual judgement.

Percept and perceptual judgement not only happen *in* time: in fact, it would be better to say that, in Peirce's view, they happen *because of* time, i.e. in virtue of the specific metaphysical notion of time that Peirce maintains in *Telepathy*. Time is, in a sense, the condition of possibility for our structuring perception in a stream of consciousness; in another sense, it is the metaphysical reality of that stream. With the rather obscure expressions "deliverance of the percipuum" (CP 7.654) and "deliverance of a flow of time" (CP 7.648), Peirce insisted not only on the temporal, processual structure of perception, but also and perhaps more fundamentally on the possibility for perception itself which is opened by the metaphysical properties of time.

As seen in 6.2, perception is articulated in three elements: the percept, the perceptual judgement, and the percipuum. The insistence of the percept, by itself, does not allow any continuity, it does not go beyond its "dumb" presence. However, the percipuum – which is the percept and the perceptual judgement considered together – also includes a "percipuum of the course of time," such that "in the present moment we are directly aware of the flow of time, or in other words that things may change" (CP 7.649).

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of magnitudes by which no part of them is the smallest possible, that is, by which no part is simple, is called their continuity. Space and time are *quanta continua*, because no part of them can be given save as enclosed between limits (points or instants), and therefore only in such fashion that this part is itself again a space or a time." (A169, B211).

Time is infinitely divisible, yet without first elements: there are not ultimate instants from which to build its flow. The absence of ultimate instants has also other consequences for the analysis of the elements of perception:

Of course, if there is no such thing as an absolute instant, there is nothing *absolutely present* either temporarily or in the sense of confrontation. In fact, we are thus brought close to the doctrine of Synechism, which is that elements of Thirdness [i.e., generality] cannot entirely be escaped. The present moment will be a lapse of time, highly confrontational [sic.], when looked at as a whole, seeming absolutely so, but when regarded closely, seen not to be absolutely so, its earlier parts being somewhat of the nature of memory, a little vague, and its later parts somewhat of the nature of anticipation, a little generalized. It contains a central part which is still more present, still more confrontational, but which presents the same features. There is nothing at all that is absolutely confrontational; although it is quite true that the confrontational is continually flowing in upon us. (CP 7.653. Emphasis of the text).

If one limited the notion of reality to that feeling of insistence, the moment of opposition between consciousness and what resists it – what Peirce calls “secondness” or “outward clash” – would constitute the whole of reality. Peirce’s compromise between the “hard fact” of the percept and the flow of the percipuum is summarised in the idea that, although nothing is pure presence (“absolutely confrontational”), yet the present is “continually flowing in upon us” (CP 7.653).

The role of Peirce’s metaphysical analysis of time in his account of perception becomes more apparent if we compare the description of the “flow” of perception with James’ 1884 article “On Some Omissions of Introspective Psychology.” James too recognised the importance of continuity for the stream of consciousness, however he strongly opposed any attempt at giving a metaphysical explanation of something (continuity) that he found so compelling in practice:

It would be calamitous for us, *à propos* of this matter, to get embogged in a metaphysical discussion about what real unity and continuity are. So I hasten to say that, by the continuity of the mental stream, all I here contend for is the absence of separate parts in it. [...]

For the stream of our feeling is sensibly continuous, like time's stream.

(James 1886: 6).

Peirce had an entirely different approach, and his final reply to James can be found in the *Telepathy* MS. Not only did he not renounce metaphysics, but he considered it an essential component of his investigation of perception. Ultimately, Peirce's metaphysical analysis of reality is strictly related to the different moments of perception, so that reality appears defined, besides continuity, by *ontological* categories corresponding to Peirce's three fundamental elements of perception, regardless of whether its process is conscious or unconscious:

There are the three elements of reality: that by which ideas spring up that have concealed within them an accord with the mass of ideas; that by which one idea acts directly on another; that force from without that weeds out a part of the ideas and strengthens the rest. (CP 7.668).

At this point, it is possible to appreciate how far Peirce has gone from Kant's notion of reality in perception. While they both insisted that the real in sensation is what resists us, Peirce not only gave a metaphysical dimension to this cognitive experience, but he proceeded to include past and future into the experience of reality (CP 7.666-7). This means that both past and future partake, to some measure, of the necessity of the present: while in Peirce's description the past acts with a "gentle compulsiveness" (CP 7.667), the future is even said to be "predetermined" (7.666). Peirce thereby meant that the future is the unfolding of some previous seed, actualising what was before only potentially: it is in this sense that Peirce embraces Leibniz's "ontological definition of possibility" (Longuenesse 1998: 148). Fabbrichesi notes that "[in Peirce,] reference to the perceiving consciousness, the temporal continuum and the connection of ideas becomes an excellent metaphor for continuity" (Fabbrichesi 2005: 55).<sup>185</sup> In fact, the continuum of time and the connection of ideas in consciousness is not just a metaphor, rather it is the real continuity of experience and reality. It is because of this notion of continuity that Peirce would eventually give a chance to the scientific investigation of telepathic phenomena:

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<sup>185</sup> "...il riferimento alla coscienza percettiva, al continuo temporale e alla connessione tra idee diviene metafora privilegiata della continuità" (Fabbrichesi 2005: 55).

No, it is absolutely necessary to admit some original connection between human ideas, and the events that the future was destined to unfold. But that is something very like telepathy. (CP 7.680-1).

Admittedly, this goes much further than the initial plan of showing how telepathic phenomena could be reconciled with ordinary perception. That could have been done simply by reasoning on hallucination. Peirce's account instead reconnects perception and reality, making telepathy a border case of ordinary perception but also a natural by-product of the evolution of mind in the universe:

Now is it not of all things the most wonderful, that the mind should be able to create an idea for which there is no prototype in nature, nor anything in the least resembling it, and that by means of this utter fiction it should manage to predict the results of future experiments and by means of that power should during the nineteenth century have transformed the face of the globe? Telepathy, with its infrequency and usual deceptiveness (for there is no reason for separating veridical from non-veridical hallucinations, as phenomena essentially different,) would be an insignificant faculty in comparison. (CP 7.686).

Peirce's conclusion is that communication at distance between two minds, if occurring at all, is only one of the many forms in which the individual mind guesses laws of nature. In a sense, both are cases of mind communication, the first from an individual mind to another individual mind, the second from the cosmic mind (i.e. the regularities developed by the evolving universe) and the individual mind.

## Conclusion

This chapter examined Peirce's "mature" theory of continuity in light of the debate around psychical research, already introduced in Chapter 5, and of Peirce's original metaphysics of continuity, called "synechism." As I illustrated, in spite of the prevalently mathematical treatments of continuity, Peirce's motivations for it lied in his theory of perception and pre-dated his engagement with mathematical theories of continuity. In a sense, Peirce's metaphysics of continuity gives substance to epistemic theories of continuity which I introduced since Chapter 2. Indeed, through this chapter I illustrated

how the notions of unconscious inferences, perceptual inferences, and the epistemology of the “Fixation” paper (1878) was employed to assess the validity of percepts.

The focus of this chapter was Peirce’s 1903 manuscript *Telepathy*, in which Peirce not only aimed at countering Gurney, Myers and Podmore’s 1886 definition of telepathic phenomena as beyond the ken of ordinary perception, but also at supporting his integration of telepathy with ordinary perception with a broadened theory thereof. Indeed, one of the most interesting results of Peirce’s analysis is his idea that generality can be already present in perception, in the form of the perceptual judgement. Introducing generality directly in perception enabled Peirce to claim for himself the title of “radical empiricist” albeit with a very different meaning than the one which James adopted. I compared Peirce’s account of perception with James’ stream of consciousness and I addressed the role of metaphysics (or lack of) in their respective psychologies.

Finally, I put Peirce’s psychological and mathematical accounts of continuity in relation with the notion of time. Time provides the physical dimension in which Peirce’s mathematical description of continuity can become effective in perception. Did Peirce achieve the task of showing that telepathic phenomena can be understood within the limits of ordinary perception? Yes, but only if his very un-ordinary metaphysics is admitted. Otherwise, telepathic phenomena may count as “ordinary perception” only in the same sense in which hallucinations do: that we cannot disbelieve them as long as they are present. Peirce however did more than simply allowing the possibility of scientifically investigating psychical phenomena. At the end of the *Telepathy* manuscript, he suggested that the kind of mind to mind communication claimed by psychical phenomena is not in fact more puzzling than the reality of scientific discoveries would be if there was no continuity between the human mind and the natural world.



# Conclusions

This work articulated Peirce's inferential theory of perception in the contexts of his logic of science, his experimental psychology, and in the field of psychological research. Along the process, relevant aspects of his metaphysics of continuity came to the fore: as Peirce stated in a 1908 paper, "The Neglected Argument for the Reality of God," "psychological speculations will naturally lead on to musings upon metaphysical problems proper" (EP 2: 438). Besides showing the connection between psychology and metaphysics, I provided the first systematic reconstruction of Peirce's inferential theory of perception in light of nineteenth century theories and practices of psychology. I brought attention to the German context (Chapter 3) but also included the British and Scottish contexts (esp. in Chapter 1) and aspects of William James' thought (in Chapters 2, 5, and 6). In the following, I summarise the main results of this inquiry and point out their contribution to contemporary debates in pragmatism as well as in the history and philosophy of psychology.

Firstly, I showed how the adoption of an inferential structure of perception by Peirce was an intellectualist move rather than a psychologistic one. This became apparent from the reconstruction of Whewell and Wundt's early influence of Peirce in Chapter 1. Wundt's introduction of inferences at all levels of cognition happened at the same time in which Whewell was fighting his cultural battle for the recognition of the role of inferences and hypotheses in science. Whewell's influence on Wundt had already been noticed by Wundt scholars (Araujo 2016; Roberts 1980); my contribution lies in bringing this connection to light in the context of Peirce's psychological sources and their relation to his early epistemology.

In Chapter 2, I substantially revisited the current debate on Peirce's psychologism by applying the notion of inferential perception, illustrated in Chapter 1, to Peirce's better-known essays on cognition (1868) and the logic of science (1877-8). Besides contextualising the very notion of psychologism to nineteenth-century debates, the main findings of this chapter concern the notion of self and the connection between the "social impulse" and the scientific method. According to my reconstruction, the notion of "self" as a reality always in the process of becoming, shaped by testimony (i.e., what others

think I am) as well as by its interactions with the world, is one of the most promising consequences of Peirce's inferentialism. Importantly, the inferential self does not deny first person experience, but just its status of foundation or ground. Along similar lines, my analysis of the "social impulse" in light of Peirce's inferentialism brings legitimacy to a feature of Peirce's theory of inquiry which Kasser (1999) and Misak (1991/2004) classified as psychologistic: the role of society (not yet the community of inquirers, but merely the presence of others holding different beliefs) in justifying the adoption of the method of science to "fixing" our beliefs to reality.

Chapter 3 provides philosophical background for Peirce's inferentialism in experimental psychology. Its originality lies in the perspective it takes on the question of the relation between Peirce's philosophy and Kant's. While the current debate mostly revolves around the influence of notions such as rationality, purpose, and the transcendental (Gava 2014; 2008; Maddalena 2019), I look at the influence of Kant's ideas (and in particular of its distortions) on the development of psychology as a science. Besides Kant, I discuss the work of Herbart, Fechner and Helmholtz in relation with the inferential theory of perception. Finally, I establish a precise connection between Helmholtz and Peirce which may open new inquiries on the specific meaning of Peirce's "empiricism."

The main contribution of Chapter 4 lies in the way it connects Peirce scholarship with current open questions in the history of astronomy and psychology of the nineteenth-century. In fact, Peirce's case constitutes an ideal case study showing the complementarity of research in astronomy and experimental psychology. On the one side, psychology was borrowing methods and instruments from astronomy; on the other side, astronomy itself could use results from psychological research to normalise its observations and minimise the amount of error. As I illustrated, Peirce applied Fechner's psychophysical equation to his proposal of a new photometric scale; moreover, he used the skills developed in his measurements of gravity to assess the relevance of his data in experiment in psychology. Lastly, the integration of astronomy and psychology also answers a recurrent worry among Peirce scholars, namely the difficulty of integrating the image of Peirce the physical scientist with his diverse and often non-orthodox interests. At least in the case of experimental psychology, this disconnection is solved in a substantial unity of methods between the two disciplines.

Chapter 5 constitutes one of the most original contributions of the thesis, integrating for the first time Peirce's concerns about psychical research and the psychology of protoplasm, a branch of research then known as "general psychology" or "physiological psychology." My reconstruction enables to appreciate the role of psychology in Peirce's evolutionary metaphysics, to broaden the scope of what is usually associated with psychological inquiry, and to contrast the different positions of Peirce and James' on the plausibility of psychical research.

Finally, in Chapter 6 the reappraisal of the role of psychical research in Peirce's theory of perception culminates with an analysis of the manuscript *Telepathy* (c.1903). In the manuscript, Peirce refines his inferential account of perception, introducing a non-inferential element, the "percept," and an element of generality, the "perceptual judgement." My contribution consists in showing how Peirce's inferential theory of perception is an answer, on the one hand, to the question of how to bring psychical phenomena within the scope of scientific investigation; on the other hand, the inferential theory of perception relied on a thorough metaphysics of continuity, which came to the point of blurring the divide between being and not being. While Peirce's metaphysics of continuity has been broached, its connection with perception and with the possibility of considering something a scientific fact is a new result of the present inquiry.

In sum, this work effectively explored Peirce's philosophical psychology from an integrated history and philosophy of science perspective. By making extensive use of primary sources and by engaging with Peirce's experiments and philosophical inquiries, I was able to give an historical, non-internalist account of the role of unconscious inferences in Peirce's philosophy of science. In spite of the historical approach, Peirce's inferentialism emerges as a theory which is still able to challenge some of today's most entrenched conceptions, such as the notion of individual (Lowe 2000; Santarelli 2019; 2017; Frega 2019). Indeed, Peirce's inferential theory of perception was "intellectualist" and for this reason it was abandoned by psychologists like Wundt and James. However, inferentialism gives a structure to the leading hope of Peirce's philosophy: that nothing is entirely unintelligible, that the boundaries of rationality can be expanded, and that in fact the very structure of rationality – its methods and its logic – can evolve according to the change in our attitude towards the objects of our experience.



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