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Introduction

- ¹ In the post face of his monograph on Hermann von Helmholtz (1821-1894), Michel Meulders adequately describes one of the greatest difficulties characterizing the study of great historical figures, namely the fact that their lives “seem like a trompe-l’œil to those who wish to scrutinize them”¹. Indeed, as necessary as it is to plough through received-views, competing (or irreconcilable) interpretations, and diverging appropriations, it might be even more important to liberate oneself from them, and take up the work of interpretation as if it were from scratch. At least, this is also what I felt it had to be done in the course of my attempts to get a firmer grasp on Helmholtz’s epistemological stance. Of course, it is not, and never will or can be for the sake of getting the interpretation *right* once and for all. The aim is rather to open up an alternative perspective from which the ‘trompe-l’œil’ can be viewed, or in the present case, to draw attention to an undercurrent in Helmholtz’s thinking that has fallen prey to historical forgetfulness. More specifically, in the course of studying the life and work of the Berlin scientist, I became increasingly intrigued by the complexity of his intellectual indebtedness to the philosophy of J.G. Fichte, especially through reading the correspondence between Helmholtz and his father Ferdinand.
- ² In this paper, I will first of all present two letters –dating respectively from 1852 and 1855–, which I found particularly interesting in this respect (section 2). Secondly, I will suggest a way in which these letters could be interpreted by means of (i) an analysis of Helmholtz’s treatment of objectivity and objectification in perception (section 3.1.), and

(ii) structuring the transcendental dimension in this treatment along the lines of two different levels of analysis (critical and metacritical) (section 3.2. and 4). The introduction of a double structure in Helmholtz's account of the objectification process will be based principally on Zöller's (2000) and Steigerwald's (2003) interpretation of Fichtean philosophy as a metacritical expansion and radicalization of the Kantian critique of knowledge. The main hypothesis guiding this exploration of the Helmholtz-Fichte relationship is the fact that Helmholtz might have felt it was necessary to supplement Kant's account of objectivity in terms of subjective constitution, with a more detailed account of the dynamics of the *process* of objectification and the constitutive role of (the sensitivity to) constraint, based on Fichte's Ego doctrine. According to Helmholtz, Kant:

"condensed into one act, which he named intuition, all the connecting links [Zwischenglieder] between pure sense perception [Sinnesempfindung] and the formation of ideas of the perceived, spatially extended object [...] as if it were merely the result of a natural mechanism that could not be an object of further philosophical and psychological investigations – apart from his final result [...] a representation"².

- 3 As I will explain, one of the crucial "connecting links" Helmholtz was missing in Kant's Critique was the one explaining how we "escape from the world of the sensations of our nervous system, into the world of real things"³. In a somewhat anachronistic formulation, we could say that objectivity, according to Helmholtz, is not sufficiently accounted for in terms of the retroactive investigation of the conditions of possibility underlying an objective representation as a *fait accompli*. The process *itself* had to be critically scrutinized as a *fait s'accomplissant*, or as an act that is constituted at its most basic level by the internal generation of a state of opposition between the Self and a radical otherness, through the sensible experience of constraint.

Helmholtz's letters to his father (1852/1854)

- 4 In 1852, early on in his scientific career, Helmholtz sketched the result of his physiological inquiries for the general public in his Inaugural Lecture *On the Nature of Human Sense- Perceptions*. He included a draft of this exposition in a letter to his father Ferdinand, requesting his opinion. In his reply, the elder Helmholtz could barely hide his enthusiasm over the fact that Helmholtz's theory on sense perceptions seemed to pave the way for:

"a new kind of philosophy that will at any rate define exactly the objective substratum of all knowledge, rendering its nature indubitably clear, and thus establishing the ego-doctrine of Fichte as the only possible mode of philosophical thought"⁴.

- 5 In re-reading the 1852 lecture⁵, I was surprised to find no mention of Fichte whatsoever (not even close), so I was even more surprised to read Helmholtz's reply back to his father, in which he stated that "It had indeed been his intention to give an empirical statement of Fichte's fundamental insight on the nature of sense perceptions"⁶.
- 6 Three years later, in 1855, there is a strikingly similar correspondence with respect to Helmholtz's lecture on *Human Vision*, in which Fichte is indeed mentioned once, but not in a way that seems of major importance⁷. But Helmholtz writes to his father:

"Last Tuesday, I gave another lecture upon "Human Vision", in which I tried to put forward the correspondence between the empirical facts of the physiology of the

sense-organs and the philosophical attitude of Kant, and also of Fichte, although I was somewhat hindered in my philosophical exposition by the need of making it popular”⁸.

- 7 Before going into the details of the way in which Helmholtz's work could indeed be interpreted as giving an empirical statement of Fichte's Ego-doctrine, let us first take a look at the most obvious ways in which we should understand this philosophical hesitation.
- 8 Helmholtz's father, Ferdinand, teacher in classical languages at the Potsdam Gymnasium, was very well acquainted with, and fond of, the philosophies of Kant, Hegel, Schelling and especially J.G. Fichte. Furthermore he was a close friend of J.G. Fichte's son, Immanuel, who was moreover Hermann von Helmholtz's godfather⁹. With his colleagues of the gymnasium, Ferdinand often entertained lively discussions on this topic at home, which made a lasting impression on the young Helmholtz. In 1891 (3 years before his death) the latter writes that “[...] the interest for questions of the theory of cognition had been implanted in me in my youth, when I often heard my father, who had retained a strong impression from Fichte's idealism”¹⁰. As the letters cited above testify, Ferdinand never stopped writing to his son on the relevance of Fichte's theory of knowledge for the rapidly developing sciences at that time. The young Helmholtz however, soon came to notice that the anti-metaphysical climate dominating the scientific world in those days urged him to be cautious in his philosophical considerations for the sake of his credibility as a scientist. Moreover, it should be noted that Hermann's epistemological ideas definitely diverged from his father's in significant aspects, although he clearly avoided intellectual conflict in his correspondence as much as he avoided conflict with the academic establishment of his time¹¹. Hermann von Helmholtz's natural tendency to shun harsh confrontations with his personal and academic surrounding, as well as his fear of not being taken seriously by contemporary scientist by overtly professing his eventual allegiance to some aspects of German idealism, have made it very hard to determine the theoretical significance of the repeated references to Fichte's work. Furthermore, these references are ambivalent, to say the least¹². Finally, it is clear from Helmholtz's biography that he did study the work of the German Idealist thoroughly, but it is much less clear which works he had read exactly, or which parts of Fichte's work had inspired him especially in his own theorizing. All these difficulties could explain the fact that this Fichtean undercurrent in Helmholtz's work has remained somewhat neglected¹³.
- 9 Nevertheless, some very interesting suggestions have been made on this topic, for example in an early essay from Steven Turner, where he states amongst others that Helmholtz did not like “Fichte the metaphysician”, but that his own thought was strongly influenced by Fichte's “to the extent that Fichte's teaching represented a phenomenology of consciousness”¹⁴. Personally, I tend to agree with this general analysis of the Helmholtz-Fichte relationship. As already suggested in the introduction, Helmholtz was a self-proclaimed Kantian in his conceptualization of experience as the result of a necessary synthesis between intuition and understanding, but was rather troubled by the apparent gap lurking between these two stems of knowledge when trying to give a systematic account of the process of objectification in perception. Furthermore, I strongly believe that Helmholtz tried to work himself out of this ‘Kantian deadlock’ –the topic of a vast amount of post-Kantian debates–, by resorting to Fichte's radicalized critique of immediacy¹⁵ and his subsequent account of ‘constraint’

as the result of an act, a *positing* (Setzen) on the part of the subject, as I will explain in the following paragraph¹⁶.

Helmholtz and the problem of objectivity and objectification in perception

Objectivity in natural science and philosophy

- 10 Helmholtz's extensive inquiries into the nature of human vision were motivated above all by an epistemological concern, namely the problem of attaining objective knowledge through observation¹⁷. The problem of objectivity, Helmholtz states, is a problem lying at the crossroads of philosophy and exact science, as:

"Philosophy and natural science approached this problem from two opposite sides; it is a common task of both. The first [...] seeks to exclude from our knowledge and ideas that which originates from the influences of the corporeal world in order to be able to state that which belongs to the mind's own activity. Natural science, [...] seeks to divide off that which is definition, designation, form of representation, and hypothesis in order to retain [...] what belongs to the world of reality. [...] Both seek to accomplish the same division, even if each is interested in another part of the divide"¹⁸.

- 11 In other words: while natural science is concerned with securing the objective nature of representations by focusing on their content –their materiality so to speak–, philosophy concentrates mainly on the necessary subjective activity involved in the constitution of objectivity. It should be clear that this formulation already implies a denial of direct (or naïve) realism, in which objectivity could be said to arise from the mere (passive) *givenness* of the object through sensibility. The case for this *critique of immediacy* in Helmholtz is built upon a physiological interpretation of Kant's pure forms of intuition, through the appropriation of the "Law of Specific Nerve Energies" developed by his teacher, Johannes Müller¹⁹. Consequently, one of the core premises of Helmholtz's psychophysiological account of perception is the radical *discontinuity* between an internal state of excitation (sensation), and its external cause (which can only be determined as such in retrospect).
- 12 Instead of accepting this gap as an insurmountable obstacle to objectivity, and a final argument for the sceptic outlook of sensationalism, Helmholtz – just as Kant had done– sought a way out, without falling into the dogmatic traps of identity theorists by securing the constrained character of the activity involved²⁰. Or in other words: while in his view, there is no object that can be accounted for in isolation from the subjects spontaneous activity, this activity should in turn be conceived of as disciplined or limited by something lying outside it. Consequently, Helmholtz's neo-Kantian physiological epistemology can be said to proceed from what Baur (2003) identifies as the two main characteristics of critical philosophy, namely (1) the critique of immediacy, and (2) the epistemology of constraint²¹.

However, the problematic nature of the paradoxical tension between these two basic assumptions in Kant was widely debated amongst philosophers from the 19th century onwards. Given the denial of any obvious *givenness* in the act of human knowing, how can we conceptually grasp the epistemological status of 'constraint' without appealing exactly to something that is *simply there*, as a radical otherness, limiting the subjects spontaneity from without? On a more basic level, this problem

could be restated as the difficulty of securing the element of passivity in the act of knowing, without 'regressing' into the assumption of immediacy in experience²²?

- 13 To be sure, Helmholtz did very much appreciate the philosophical work Kant had done in determining the formal conditions of representation (see section 1), but on the other hand felt that the philosopher had failed to account for the necessary conditions underlying the possibility of the *externalization* of internal states of excitation. Or in other words: he set himself the task of explaining how an element of passivity or constraint – that Kant had rightfully identified as a precondition for experience or empirical knowledge – first appeared in the perceptual act.

From critique to metacritique

- 14 In trying to get a firmer grip on the Helmholtz-Fichte relationship, my reading of Helmholtz's optics spontaneously evolved from a purely historical one, to an interpretation of his writings along the lines of a more general multi-layered transcendental framework, that is constituted mainly by the historical progression from Kant's critique of knowledge, to Fichte's metacritique, a shift which Steigerwald describes as a change in focus from:

"the interrogation of how cognition in general is possible to an interrogation of how a *critique* of cognition is possible [...]', For Fichte this metacritique required attending to the activity of the I [Ich] in thinking, to thinking or acting with the I in all its cognitive processes"²³.

- 15 In a similar vein, Zöllner describes Fichte's metacritique as follows:

"Fichte thus supplements Kant's critical investigation of the possibility of objective knowledge and its systematic completion in the *Wissenschaftslehre* through a critical investigation of philosophical knowledge by radicalizing the project of philosophical critique from philosophy's critique of the knowledge of objects to the metacritique of philosophical knowledge"²⁴.

- 16 So at the first level, we get empirical cognition, while the second, critical level coincides with the Kantian project of examining the subjective conditions underlying empirical cognition, through abstracting from its phenomenal unity, and an a priori determination of its necessary structural foundation. Kant's basic insight in this respect obviously came down to the fact that empirical cognition is only possible through the synthesis of material elements obtained through sensibility, and the structuring of this materiality through the subjective organization of the knowing mind²⁵. The distinctions, on which the possibility of experience is based, are correlated at its most general level with the presumption of a passive receptivity of materiality, and an active imposition of structure on the part of the subject.
- 17 The third, *metacritical* level actually consists of a critique of the presuppositions underlying the critical investigation, and can be linked historically with Fichte's work. Now if we take this step, which according to Fichte was an inevitable completion of the Kantian project, we are compelled to question the ground or conditions which underlie the *very possibility* of the distinctions at work on the critical level, and more specifically, the distinction between matter and form, between activity and passivity in experience²⁶. Or in other words, as Fichte suggests in his *System of Ethics*, a transcendental idealism which confines itself to finding the subjective conditions underlying the possibility of objective representation leaves a more fundamental question untouched, namely the question pertaining to the origins of our awareness of

a realm differs from that of the Self, or the origins of the experience of constraint (*Widerstand*)²⁷.

- 18 The question that is raised by this metacritical perspective is captured by K. Ameriks as follows:

“Fichte has a story to tell about the active/passive distinction, a story to the effect that this distinction need not be simply assumed, as it is by Kant, but it can be argued to be a condition of the self's certain self-awareness”²⁸.

- 19 In the SSL, he founds the constitution of this active/passive distinction in what he identifies as one of the most fundamental laws of consciousness. According to Martin, this law can be considered as an attempt to explain the origin differential awareness of a self and a non-self in experience, which constitutes the necessary basis of every human activity as a *determinate* activity²⁹; this law is the “principle of resistance”

“what does a ‘determinate activity’ mean? And how does an activity become determinate or determined? Merely by having some resistance posited in opposition to it – posited in opposition: that is to say, a resistance that is thought of by means of ideal activity and imagined to be standing over against the latter.” (GA I/5, 25)³⁰

- 20 This principle actually forms the most fundamental condition of possibility of the I's production of a Not-I. This state of opposition between self and non-self, which, according to Fichte, arises from the principle of resistance, thus underlies the very possibility of a transcendental analysis of experience into material and formal aspects, into passivity and activity. To get a firmer grasp on what this means, we can turn again to some passages of the SSL, where Fichte aims primarily at an examination of the conditions of possibility for agency (*Wirksamkeit*). Some have suggested that this central concern in Fichte's philosophy is in fact to be considered as “an extension of Kant's Transcendental Deduction from the *I think* to the *I will*”³¹. This matches with Fichte's complaint, mentioned before, that the main focus of philosophy had always been theoretical, in the sense that philosophy was mainly concerned with asserting “the correspondence of our representations with things that exist supposedly independently from those representations”. (GA I/5, 21)³² But how is this experience possible, if the I in the ‘I know’, does not somehow *know itself*, in order to represent something that is independent from it? Accounting for the way in which this subject continuously discovers itself in experience is indispensable according to Fichte, because it is constitutive for the state of opposition that underlies the experience of a world that exists in its own right.

- 21 In this way, Fichte's inquiries into practical philosophy lead him to the conclusion that the concepts of free will and voluntary acts are not just important within the restricted domain of ethics, but have a constitutive role in experience itself³³. As such, Fichte's epistemology transcends the traditional differentiation between practical and theoretical philosophy: the analysis of the conditions of possibility of “*Wirksamkeit*” amounts to the formulation of principles that are basic to answering the questions of theoretical philosophy. As Fichte puts it: “our freedom itself is a *theoretical principle for the determination of our world*” (GA I/5, 77)³⁴, while Martin summarizes this line of thought as follows: “To experience of resistance one must somehow also experience oneself as striving toward or for something – an endeavor that one finds thwarted by the resistance of the world”³⁵.

- 22 In conclusion, we could state that Fichte tried to solve the problematic tension between a critique of immediacy and an epistemology of constraint, through a radicalization of

the subject's activity at a more basic level of experience. As Baur suggests, one of the main differences between Kant's and Fichte's critical philosophy is the fact that the latter's philosophical system is founded in the ideal, unconstrained activity of the knowing subject, whereas the former had rooted his critique of knowledge in the assumption that all experience is principally constrained by a radical otherness³⁶. Indeed, Fichte does share this fundamental insight with Kant, but surely did not consider it to be the zero-point of his system. Instead, a further critical examination of the epistemological status of 'constraint' (Widerstand) is needed, in order to avoid the fundamental problems connected with Kant's presumed dualism. Passivity, constraint, limitation, can only be thought of by means of ideal activity, (cf. GA I/5, 21) and hence, critical philosophy should proceed from the abstract assumption of an unconstrained spontaneity of the subject, and not, as is the case in Kant, from its limitations. Again: not because these limitations are not important to Fichte, but quite on the contrary, to found it in a more fundamental principle (roughly: the striving subject), and thereby giving it a firmer ground through a metacritical analysis.

- 23 In the next section, I will suggest a way in which Fichte's *completion* of the Kantian project seems to be at work in Helmholtz's writings on perception.

Towards a naturalized epistemology of constraint?

- 24 In 1892 –two years prior to his death– Helmholtz gives one of his last public lectures in Germany in the National Assembly of the Goethe Society. In this speech – undoubtedly one of the most poetic texts ever written by the Berlin scientist – Helmholtz sketches a mature version of his views on the epistemology of human vision, on the basis of the *Study Room*-scene of Goethe's *Faust I*. Faust, Helmholtz notes: “[...] saves himself from the unsatisfactory state of knowing and cogitation turned in itself, a state where there is no hope of acquiring truth and no means of revealing actuality, by the act”³⁷. This statement could actually be considered to be at the core of Helmholtz's epistemological outlook, as he determines active experimentation as the only possible way to “escape from the world of the sensations of our nervous system, into actuality (*Wirklichkeit*)”³⁸. His theory of experimentation (as a precondition for objectification) is thus meant to provide an answer to the question raised in the introduction, namely the problem of accounting for the (empirical) modalities enabling the externalization of pure internal states of sensory modifications, or of the genesis of a differential awareness between I and not-I in perception. For Helmholtz, *the act* is the final arbiter to distinguish the *Erscheinung* from mere *Schein*³⁹. *Final*, because it is only through voluntary action that the subject is aware of his own ‘willensimpuls’, and by inference also of that which is opposed to it, the object. The awareness of constraint, or of a Not-I in perception, thus critically depends upon a pre-intuitive grasp of subjective intentionality.
- 25 In Helmholtz's theorizing, the awareness of agency in perception arises from the physiological mechanisms associated with what he calls ‘muscular feeling’, a compound term for three different kinds of sensations:
- “(1) the intensity of the effort of will (the feeling of innervation), (2) the tension of the muscles, that is, the force by which they try to act, and (3) the result of the effort, which [...] makes itself felt in the muscle by a contraction which actually takes place [...]”⁴⁰.

- 26 Helmholtz's muscular feeling actually forms the physiological condition for the awareness of an opposition between that what "the Ego can and cannot change"⁴¹, a precondition for the externalization of those sensory modifications that cannot be interpreted in terms of subjective production. More than just accounting for the experience of agency, *muscular feeling* thus seems to play a more fundamental epistemological role as the foundation of the internal-external distinction in experience.
- 27 The most remarkable conclusion to be drawn from this line of reasoning is the fact that according to Helmholtz, the perceptual object is first recognized as a negation of the subject – or as that which is basically indifferent towards subjective striving. It is not constraint, but the willing Self, that forms the basis of Helmholtzian epistemology. It is more than probable that this part of Helmholtz's optics actually forms the background against which we should understand the 1852 statement that it had "indeed been his intention to give an empirical statement of Fichte's Ego-doctrine"⁴². At least, I do not see how we could make sense of it otherwise.
- 28 As I announced in the introduction, the investigations into Helmholtz's work on the basis of the historical progression from Kant to Fichte, have led me to analyse the physiological optics along the line of three different levels of analysis, namely empirical, critical and metacritical – with the last two revealing the double structure of Helmholtz's philosophical inquiry into the nature of objectivity and objectification:
- a. *Empirical.*
- 29 The empirical dimension (which is actually formulated by means of J.S. Mills views on inductive reasoning), is captured by Helmholtz's theory of perception as unconscious (inductive) inference⁴³. A momentary sensation (in itself nothing more than a bodily state of excitation) functions as a minor premise, and evokes a hypothesis on the probable cause, which in turn generates predictions on what to expect if the hypothesized cause was indeed present. The major premise is best conceived of as defined as an abstract and dynamical representation of lawlikeness, which governs the process of perception in a generative, top-down fashion, on the basis of prior knowledge⁴⁴.
- a. *Critical.*
- 30 What distinguishes Helmholtz from strict empiricist theories of perception such as those elaborated by J.S. Mill and David Hume however, is the fact that according to the former, the law of causality is not *derived* from inductive inference. It is rather the other way around: the capacity for inductive inference (and the determination of lawlikeness) depends upon causality as an a priori, transcendental law. The experience of law-likeness is thus not a contingent figment of imagination as it is, for example, in Hume; but a *necessary* condition for experience itself⁴⁵. Or as Helmholtz himself states:
- "The law of causality [...] expresses a trust in the complete comprehensibility of the world. Comprehension [...] is the method whereby our thought masters the world, orders the facts and determines the future in advance. [...] *The law of causality [...] is an a priori given, transcendental law.* A proof of it from experience is not possible, since the first steps of experience [...] are not possible without employing inductive inference, i.e. without the law of causality"⁴⁶.
- 31 So, as Hatfield puts it, Helmholtz asserted that the mind "[...] is driven to seek the lawful,' and 'can only comprehend a nature that is lawful'"⁴⁷. I would consider this to be a critical aspect of Helmholtz work, because it answers the question of 'what it is to

understand' by means of a critical examination of what is needed in order for something to be *comprehensible*. And what is needed, according to Helmholtz, is the a priori imposition of structure upon any *possible* 'given', which logically precedes all a posteriori organization of empirical reality.

a. *Metacritical.*

- 32 If we only take into consideration the two levels as described above, a Helmholtzian perceiver could just as well be a quite passive 'observer-with-calculator', which is obviously not the case, given the pivotal role Helmholtz assigns to active experimentation in perception. If we take a closer look at the above sketched account of perception as unconscious inference, it soon becomes clear that it actually *implies* the same obscure gap between pure intuition and objective representation, as was present in Kant's transcendental aesthetics, according to Helmholtz. In the perceptual process as an inductive syllogism, the gap seems to be hidden behind the stripe marking the logical *therefore*. The problem is that the premises of the syllogism all appeal to internal states - the minor represents a state of functional activity in the nervous system, while the major is based upon memory - while the conclusion somehow appeals to an external state of affairs. At this point, Helmholtz - as scientist - felt that all the intermediary steps should be accounted for empirically, while philosophically speaking, Helmholtz seems to question the necessary formal conditions underlying his own analysis of perception. The object under investigation is no longer experience (as was the case on the preceding level) itself, but rather the duality implied in the *analysis* of experience. It is at this level that we should situate Helmholtz's analysis physiological mechanisms underlying the internal generation of a difference, or in other words: the foundations of the sensitivity to constraint, as described above. The Fichtean nature of the problems at stake at this level (as described in section 3) can hardly be overlooked, and moreover, the fact that these philosophical problems are 'fed back' - so to speak - to the empirical level in Helmholtz's theorizing, makes the interpretation of Helmholtz's account of perception as a *naturalization of the epistemology of constraint* very appealing.

Conclusion

- 33 In the fifth lecture of his *Sonnenklarer Bericht* (GA I/7, 246-252), Fichte reminds his readers that his Science of Knowledge primarily aimed at a philosophical reinvention of experience *as if* it were the product of some original construction (cf. GA I/7, 249). Taking the *as if* of the transcendental reconstruction of experience and the theoretical postulating of its origins for a categorical truth, is an inexcusable mistake. Since experience is only possible to the extent that all of its conditions have been fulfilled, it is therefore genuinely impossible to find any of these conditions in isolation in our everyday functioning. Prior to the act of philosophical reinvention, critical abstraction and analysis, there is nothing but unity, determinateness, and givenness.
- 34 The same warning applies to what has been presented in this paper. The framework I have suggested for the analysis of Helmholtz's theory of optics, should by no means be understood as a blueprint for the successive phases involved in perception, which would be actually be utterly absurd. And in the same vain, it is important to note that I have not attempted to sketch a genuine historical evolution in Helmholtz's thought; the levels of analysis I have distinguished are the product of a reconfiguration of

elements and questions that Helmholtz himself has always presented in their completeness and interdependency. Therefore, it has to be considered as a *reinvention* in Fichte's sense, and not as a reconstruction of facts or historical truths.

- 35 As I have indicated, this reinvention was initially motivated by an attempt to make sense of some of the remarks on Fichte as found in the correspondence between Helmholtz and his father. In the process of my investigation however, I soon hit the boundaries of what could be sensibly said on the matter on a factual basis, given the difficulties I described in section 3. Instead, Helmholtz's Fichte more or less came to function as a symbol, no more than an indicator for a purposiveness inhering Helmholtz's way of questioning the fundamental structure of experience. The direction in question is regulated by the fact that any talk about objectivity or objectification, according to Helmholtz, is only relevant to the extent that it is seen as a means to fulfil the natural tendency of any organism to *master* its environment and expand the range of action possibilities. Fichte's conception of the Ego as an absolute, self-positing activity, tending to extend centrifugally if unchecked by a *heterogeneous other* fits well with this view of the subject. (cf. GWL GA I/2, 408)
- 36 Helmholtz has brought the Fichtean dynamics of striving and check, involved in the interactions with this obscure otherness, to the level of sensibility, and gave it a physiological underpinning. Therefore, just as his teacher Johannes Müller had shown that the Kantian critique of immediacy was just not some theoretical postulate floating through thin air, but could be understood at least partly from within the physiological make-up of the sensory apparatus, Helmholtz's work tells a similar story with regard to the second basic premise of Kantian epistemology (see page 5). With Helmholtz, the principally *disciplined* nature of the very structure of experience becomes inscribed in the body itself. As I have explained, the account Helmholtz offers of this is based partially on ideas that are akin to Fichte's Ego-Doctrine (as the Berlin scientist himself acknowledges in the cited letters to his father), and should thus be read against that background. An interesting implication of this is that we might want to reconsider Ferrari's perspective on Helmholtz as a physiological neo-Kantian⁴⁸, in the sense that the naturalization project (i) goes beyond a physiological statement of Kant's critique of immediacy, and (ii) is not limited to Kantian philosophy as such, but should also be understood from the perspective of what Zöllner (2000) and Steigerwald (2003) have called Fichte's metacritical expansion and radicalization of critical philosophy.

NOTES

1. M. MEULDERS, *Helmholtz. From Enlightenment to Neuroscience*, Cambridge: MIT Press, 2010, p. 211.
2. H. VON HELMHOLTZ, "Goethe's Presentiments of Coming Scientific Ideas," in *Science and Culture. Popular and Philosophical Essays*, D. CAHAN (ed.), Chicago: University of Chicago Press, 1995, p. 394.
3. H. VON HELMHOLTZ, *Vorträge und Reden I*, Braunschweig: Freidrich Vieweg und Sohn, 1896, p. 115 (my translation).

4. L. KOENIGSBERGER, *Hermann von Helmholtz*, trans. by LORD KELVIN, Oxford: Clarendon Press, 1906 [1903], p. 92.
5. H. VON HELMHOLTZ, "Über die Natur der menschlichen Sinnesempfindungen", in *Königsberger Naturwissenschaftliche Unterhaltungen*, 3, 1854, p. 1-20.
6. L. KOENIGSBERGER, *Hermann von Helmholtz*, p. 92.
7. Cf. H. VON HELMHOLTZ, *Vorträge und Reden I*, Braunschweig: Freidrich Vieweg und Sohn, 1896, p. 85-119.
8. L. KOENIGSBERGER, *Hermann von Helmholtz*, p. 138.
9. Cf. R.M. WARREN, et al., *Helmholtz on Perception*, New York: John Wiley & Sons, 1968, p. 3-15; and T. LENOIR, *Instituting Science. The Cultural Production of Scientific Disciplines*, Stanford: Stanford University Press, 1997, p. 145.
10. H. VON HELMHOLTZ, "Hermann von Helmholtz. An Autobiographical Sketch," in: *Science and Culture. Popular and Philosophical Essays*, p. 390.
11. In his *Autobiographical Sketch*, Helmholtz tells for example that when writing, he always had his fellows scientists in mind: "I asked myself whether they would approve of it. They hovered before me as the embodiment of the scientific spirit of an ideal humanity, and furnished me with a standard". (H. VON HELMHOLTZ, "Hermann von Helmholtz. An Autobiographical Sketch," p. 391.)
12. With respect to this difficulty, it is interesting to note the paradox between that what Helmholtz had written to his father in 1852 and 1855, and some of the statements he subsequently makes in his *Treatise*, for example: "The subsequent idealistic systems of J.G. Fichte, Schelling and Hegel all emphasized the theory that the idea is essentially dependent on the nature of the mind; thus neglecting the influence which the thing causing the effect has on the effect. Consequently, their views have had slight influence on the theory of the sense-perceptions". (H. VON HELMHOLTZ, *Treatise on Physiological Optics III*, trans. by J.P.C. Southall, New York: Optical Society of America, 1925, p. 36) In my view, this general ambivalence can be explained at least partly by the difficulty Helmholtz himself experience in trying to reconcile his naturalized critique of immediacy (see section 3.1.) with his attempts to secure the 'thinghood', or 'thatness' of perceptual objects. Peculiarly enough, Helmholtz actually seems to have succeeded in that endeavor through modifying and naturalizing Fichte's epistemology, as I will explain in what follows.
13. To be sure: some authors have done some considerable efforts to get a firmer grip on the Helmholtz-Fichte relationship, for example M. HEIDELBERGER and S. TURNER. I would especially recommend the articles the former has written on the subject, although I am somewhat troubled by the fact that he conceptualizes the parts in Helmholtz's theorizing that are obviously embedded in Fichtean Philosophy as 'Experimental Interactionism,' a term that in my view does not honor the constitutive nature of human agency in Helmholtz's theorizing. Nevertheless, I have very much enjoyed reading for example M. HEIDELBERGER, "Force, Law, and Experiment," in *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*, ed. D. CAHAN, Berkeley: University of California Press, 1993, p.461-497.
14. R.S. TURNER, "Hermann von Helmholtz and the Empiricist Vision," in *Journal of the History of Behavioral Sciences*, 13, 1977, p. 57.
15. M. BAUR, "Kant, Lonergan, and Fichte on the Critique of Immediacy and the Epistemology of Constraint in Human Knowing," in *International Philosophical Quarterly*, 43(1), 2003, p. 105.
16. The so-called 'Kantian Deadlock' obviously comes down essentially to the charge of dualism, which has often been raised with respect to Kant's Critique; for an overview see for example S. ENGSTROM, "Understanding and Sensibility," in *Inquiry*, 49(1), 2006, p. 2-25. I should note that while I am quite certain that Helmholtz has taken this to be a valid objection – or at least a problematic aspect of Kant's account of experience – this is not necessarily the case for me, based on my own reading of Kant. Therefore, within the scope of this paper, any mention of this

presumed hiatus should be read within the context of my attempts to clarify some of the basic premises in Helmholtz's thinking, not as the statement of a matter of fact.

17. H. VON HELMHOLTZ, *Vorträge und Reden II*, Braunschweig: Freidrich Vieweg und Sohn, 1896, p. 218.

18. H. VON HELMHOLTZ, "The Facts in Perception," in *Science and Culture. Popular and Philosophical Essays*, p. 344.

19. In short, this law states that the quality of our sensations is not determined by the external object exciting it, but rather through the peculiar make-up of our sensory apparatus. Sensations [Empfindungen] – conceived of as *symbols* in Helmholtz's theorizing – thus require an act of interpretation, of subjective structuring, in order for them to count as an objective perception. See for example H. VON HELMHOLTZ, "The aim and Progress of Physical Science," in *Science and Culture. Popular and Philosophical Essays*, p. 221.

20. Helmholtz considers sensationalism or intuitionism to be the exact opposite of identity-theory. Where for the former, there is no hope of attaining any objective knowledge at all (because of the impossibility of a correspondence between ideas and their objects), the latter dogmatically assumes an identity or pre-established harmony between nature and mind. H. VON HELMHOLTZ, *Treatise on Physiological Optics III*, trans. J.P.C. Southall, New York: Optical Society of America, 1925, p. 18-19.

21. M. BAUR, "Kant, Lonergan, and Fichte on the Critique of Immediacy and the Epistemology of Constraint in Human Knowing," in *International Philosophical Quarterly*, 43(1), 2003, p. 91. According to G. Banham, these two main characteristics have given rise to competing interpretations on the essence of Kantian epistemology. While some tendend to (over)stress the centrality of the notion of subjectivity in Kant's Critique, others thought of it more as an epistemology that was centered around the foundational constraints to knowledge. Personally, I see no obvious reasons why one of these two foundational theses would be more central than the other. G. BANHAM, "Kantian Ontology," 2005, p. 25, URL: http://galatea.meccahosting.com/~a000594b/PAPERS_files/Kantian%20Ontology.pdf (seen on 10-17-2011)

22. Baur formulates the problem at stake like this: "How is it possible to accept the Kantian critique of immediacy while also giving an epistemologically adequate account of the constrained or finite character of human knowing (i.e. an account that does not rely on some appeal to what is simply 'given')?" M. BAUR, "Kant, Lonergan, and Fichte on the Critique of Immediacy and the Epistemology of Constraint in Human Knowing," in *International Philosophical Quarterly*, 43(1), 2003, p. 91.

23. J. STEIGERWALD, "The Dynamics of Reason and its elusive Object in Kant, Fichte and Schelling," in *Studies in the History of Philosophy of Science*, 34, 2003, p. 112.

24. G. ZÖLLER, "From Critique to Metacritique: Fichte's Transformation of Kant's Transcendental Idealism," in *The Reception of Kant's Critical Philosophy*, ed. S. SEDGWICK, Cambridge: Cambridge University Press, 2000, p. 130.

25. See KrV B 74.

26. For an interpretation of Fichte's philosophical project as an attempt to overcome the dualistic tendencies in Kant's work, see for example: S. LUMSDEN, "Fichte's Striving Subject," in *Inquiry*, 47, 2004, p. 123-142.

27. This question is raised by Fichte in the context of his critical inquiry into the formal conditions for 'Thätigkeit', or agency, cf. SSL, GA I/5, 25.

28. K. AMERIKS, "The Practical Foundation of Philosophy in Kant, Fichte, and After," in *The Reception of Kant's Critical Philosophy*, ed. S. SEDGWICK, Cambridge: Cambridge University Press, 2000, p. 121.

29. W. M. MARTIN, "Fichte's Transcendental Phenomenology of Agency," 2003, URL: <http://privatewww.essex.ac.uk/~wmartin/FichteAgencyEnglish.pdf> (seen on 10/11/2011)

30. Quoted from J.G. FICHTE, *The System of Ethics*, ed. G. ZÖLLER and D. BREAZEALE, Cambridge: Cambridge University Press, 2005, p. 12.
31. G. BECK, "From Kant to Hegel – Johann Gottlieb Fichte's Theory of Self-Consciousness," in *History of European Ideas*, 22(4), 1996, p. 277. Manfred Frank suggests that Fichte's attempt to find an irreducible subjectivity is actually a response to the Kantian difficulties with accounting for the way in which the 'I' grasps itself as a subject, in a non-objectal manner. An objectal representation of the Self would be one that is the result of a reflection through which the subject is actually objectified; the problem with these so called reflection models of self-consciousness, according to Frank, is that they (1) are circular (since they presuppose that which they want to explain, and (2) cannot differentiate between the consciousness of an object and self-consciousness. M. FRANK, "Non-objectal Subjectivity," in *Journal of Consciousness Studies*, 14(5-6), 2007, p. 152-173.
32. Quoted from J.G. FICHTE, *The System of Ethics*, p. 8.
33. W.M. MARTIN, "Fichte's Transcendental Phenomenology of Agency".
34. Quoted from J.G. FICHTE, *The System of Ethics*, p. 70.
35. W.M. MARTIN, "Fichte's Transcendental Phenomenology of Agency", forthcoming, p.12
36. M. BAUR, "Kant, Lonergan, and Fichte on the Critique of Immediacy and the Epistemology of Constraint in Human Knowing," in *International Philosophical Quarterly*, 43(1), 2003, p. 105.
37. H. VON HELMHOLTZ, *Vorträge und Reden II*, Braunschweig: Freidrich Vieweg und Sohn, 1896, p. 359 (my translation).
38. H. VON HELMHOLTZ, *Vorträge und Reden I*, p. 115 (my translation).
39. H. VON HELMHOLTZ, "Goethe's Presentiments of Coming Scientific Ideas," in *Science and Culture. Popular and Philosophical Essays*, p. 411.
40. H. VON HELMHOLTZ, *Treatise on Physiological Optics III*, trans. J.P.C. Southall, New York: Optical Society of America, 1925, p. 243.
41. Full quotation: "[...] it is clear that a separation of thought and reality first becomes possible after we know how to complete the separation of that which the Ego can and cannot change. This, however, only becomes possible after we recognize which law-like consequences the will's impulses have at that time". H. VON HELMHOLTZ, "The Facts in Perception," in *Science and Culture. Popular and Philosophical Essays*, p. 362.
42. L. KOENIGSBERGER, *Hermann von Helmholtz*, trans. LORD KELVIN, Oxford: Clarendon Press, 1906 [1903], p. 92. See also: section 2.
43. H. VON HELMHOLTZ, *Vorträge und Reden II*, Braunschweig: Freidrich Vieweg und Sohn, 1896, p. 233.
44. If we only take into account this empirical dimension in Helmholtz's work, it is quite understandable that he is credited amongst other for founding the contemporary paradigm of perception as Bayesian inference. I strongly agree with Westheimer however, that this model of perception has just some rather superficial similarities to Helmholtz's, and that it does not capture the complexity of Helmholtz's optics, especially with regard to the pivotal role of agency. G. WESTHEIMER, "Was Helmholtz a Bayesian? A Review," in *Perception*, 37, 2008, p. 1-10.
45. G. SCHIEMANN, *Hermann von Helmholtz's Mechanism: The Loss of Certainty*, Springer, 2009, p. 127.
46. H. VON HELMHOLTZ, "The Facts in Perception" in *Science and Culture. Popular and Philosophical Essays*, p. 363.
47. G. HATFIELD, "Helmholtz and Classicism: The Science of Aesthetics and the Aesthetics of Science," in *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*, p. 557.
48. M. FERRARI, *Retours à Kant. Introduction au néo-Kantianisme*, Paris: Editions du Cerf, 1997.

ABSTRACTS

In the present paper, I analyse the influence of Fichte's philosophy on Helmholtz's treatment of objectivity and objectification in perception. The exploration of the relationship between both philosophers, a relationship that has been somewhat disregarded in the Fichte-research, attempts to get a firmer grasp on the extent to which Helmholtz's account of the objectification process in perception is based on Fichte's Ego doctrine.

INDEX

Keywords: Helmholtz, experience, Kant, metacritique

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