The Real in Perception and how to get closer to it: Peirce's experimental psychology 1868-1885 in the context of his logic of science

[Thank you for attending this workshop. In particular, I need to thank Dr. Chris Skowronski who organised it with infinite patience and a great determination and you, PhD colleagues, who read the talk and will listen to it now. I am looking forward for your comments and insights.]

The title of this work is "The real in perception," but it could have been as well "the perceptual in the real": it concerns the epistemic status of perception, but it does not wish to suggest an initial divide between the real and our perception of it. Although sharing the same world, perception and reality are not the same thing, and in this respect I justify the second part of the title, "how to get closer to it [reality]." In a very broad, initial sense, "reality" only needs to be what *resists* our opinion and our activity. The various strategies to "get closer to it" are explored in the context of the psycho-physical debate of the nineteenth century. In particular, I am interested in tracing back the notion of reality and the relation between perception and reality in Peirce to the Kantian and post-Kantian debate on the operations of our faculties. Concerns on those operations were investigated from a psychological, physiological, and philosophical perspective: although an *a posteriori* investigation of the relation between perception and reality was not Kant's chief concern, it greatly occupied post-Kantian thinkers. The relation between perception and reality inspired idealists and romantics; idealists attributed all spontaneity to reason (i.e., Fichte, Hegel), romantics recognized the importance (and to times the prominence) of feeling (i.e., Schleiermacher, Novalis, Schiller). Moreover, the possibility of a scientific investigation of perception was variously discussed by *Naturphilosophen* (i.e., Schelling) and psycho-physicians (i.e., Fechner).

The account of the relation between reality and perception is articulated as follows:

1) Firstly, I propose a reading of some passages from Kant which highlights the character of resistance and dimension of potentiality of reality as it appears as the content of our concepts. I then compare those passages with a couple of passages from Peirce, where the two attributes of reality (resistance and potentiality) become explicit. In both authors, reality has a component of sheer resistance (the Peircean "outward clash") upon which an element of generality is necessarily inserted. How generality comes about is different in Kant and Peirce, but its effect on the definition of reality is quite similar, making reality something to be understood in the dimension of potentiality rather than actuality. For both Kant and Peirce, the *meaning* of "reality" resides in the possible effects that an object (a "phenomenon" in Kant's terms) may produce in future experience.

2) Second, I comment on Kant's notion of reality as the content of perceptions. I draw on his "Anticipations of Perception," which had a great impact on the subsequent generation of post-Kantians and on the development of psycho-physics as a science. The relation between reality, feeling, and continuity is explored at length in Peirce's 1892 "The Law of Mind" (EP1: 312-333). Here I will limit myself to an account of Peirce's 1885 experiment "On Small Differences of Sensation" and to draw some parallels between Kant's theory of the "Anticipations" and Peirce's researches. In the end, perhaps the most important difference is that Peirce's project is metaphysical while Kant's is critical.

3) Finally, I develop the argument for Peirce's *need* of psychological investigation in the framework of his philosophical and metaphyiscal project. Kant can do without psychology because his constructivism is *a priori*; Peirce on the other side needs to show how the *mannigfaltigkeit* of

sensory data can be unified in a synthesis which is to be performed by our faculties but which cannot be justified by them. The culmination of the *a posteriori* project of Peirce is perhaps to be seen in the psycho-physical experiment "On Small Differences of Sensation" published with Joseph Jastrow in 1885. However, psychological experiments cannot replace philosophical reflection entirely. My hypothesis at this stage of research is that Peirce will shift the burden of proof from the transcendental constitution of our faculties to the logical analysis of inference, which is a structure working across the different domains of psychology and logic. Peirce does not give a systematic account of inference in perception; there are however enough elements to argue that Peirce saw the physiological work performed by our nervous system as a kind of inference, more precisely an unconscious inference.

In the rest of my project, I will pay attention to the in-between of Kant and Peirce as well. One of the striking cases is that of Hermann von Helmholtz. Starting to publish around 1853, Helmholtz will be for the first part of his career ('till 1868) the most explicit advocate of a theory of perception based on unconscious inference. According to Helmholtz's theory, perception would occur via an (unconscious) process of symbolization (1867: *Handbook der Physiologischen Optiks*). The possible influences of Helmholtz on Peirce and of the whole post-Kantian milieu on the development of American pragmatism still need to be worked out.

1. Reality in the concept: "was *dawider* ist" (Kant, *KrV,* A 104)

In the first edition of the *Critique of Pure Reason* (1781), Kant famously writes a deduction of the categories which is much longer and much more articulated than the one we find in the second edition (1787). The debate on the two deductions is a whole chapter in the history of western philosophy, and I am not going into it; what matters here is not to ascertain what Kant really thought, nor whether the deductions are sound arguments or not, but simply to highlight passages that were accessible to all readers of Kant and that could influence further philosophical elaboration on the notion of reality. (On how the account of the 1781 edition can be seen as compatible with the much condensed one of the 1787 edition, see Sarah Gibbons (1994), *Kant's Theory of Imagination. Bridging the Gaps in Judgement and Experience.* Clarendon Press: Oxford, esp. chp. 1).

It is important to note that the notion of reality as that which stands against our perception, or our attempts to modify it, is not a new idea introduced by Kant. In fact, the idea that what exists outside ourselves must offer some resistance can be traced back at least to Berkeley, with whom Kant was of course familiar. In his *Theory of Vision* (1703; *New Theory of Vision*, 1733), Berkeley explains the very idea of external existence in analogy with the sense of touch. While "visible objects are only in the mind, and don't suggest anything external, […] except through habitual connection, in the way words suggest things" (§76), what is "tangible" is clearly perceived as existing without us (§96):

> "…so if the blind person by moving his hand over the parts of the man who stands before him perceives the tangible ideas that compose the head to be furthest from that other combination of tangible ideas that he calls 'earth', and perceives the tangible ideas that compose the feet to be nearest to it, he will describe that man as 'erect'. But if we suppose him suddenly to receive his sight and to see a man standing before him, it's obvious that he wouldn't judge the man he sees to be erect or inverted. He has never known those terms applied to any but tangible things, or existing in the space outside him, and what he sees is neither tangible nor perceived as existing outside him, *so* he

> can't know that in propriety of language *t*hey are applicable to it." (My underscoring)

The blind man touches the various parts of the body of an erect man and can *therefore* ascertain that the man in front of him is actually erected; he has experienced not only the resistance of the individual parts of the other man's body, but also their relation and their orientation on the ground. Moreover, the blind man is not only *ascertaining* that the man in front of him is erect; he is giving us the illustration of what being erect actually *means*: a man is erect if his body is so-and-so construed and hist parts are so-and-so oriented in respect to the ground.
Kant transposes the feeling of resistance associated to the sense of touch to the whole process of knowing in general. In A104, Kant is illustrating, from an *a priori* perspective (hence the label "metaphysical deduction"), the possibility of experience in general, i.e., what "remains as its underlying ground when everything empirical is abstracted from appearances" (A96). This ground however is not an object, but rather an activity: the spontaneous activity of synthesis, which is analysed in three stages – Intuition, Imagination, and Concept. At the stage of concept, where the passage of A104 belongs, Kant deals with representations. Although what is performed is an activity, i.e. the building of a representation out of a manifold, what we are mostly conscious about is not the activity itself but the outcome (A103), i.e., representations themselves. At this point, we naturally fall into the habit of asking what object is *corresponding to* our representation; but nothing can be present to us if not through a representation (A104). What follows is a much discussed passage, which I quote at length:

> "It is easy to see that this object must be thought only as something in general = *x*, since outside our knowledge we have nothing which we could set over against [*gegenübersetzen*] this knowledge as corresponding to it." (My underscoring)

Uncountable pages have been spent in deploring the fact that ultimately knowledge has to rest upon an unknowable, "general" *x*; the point however here is not *what the x is*, but *what the x does*: and the function of this *x* outside our representation is precisely to *offer resistance* to our faculties, so that the resulting representation is moulded by that resistance and not an arbitrary product of our mind. Kant goes on [my translation[1]]:

> "Now we find that our thought of the relation of all knowledge to its object carries with it some necessity, that is the object is seen as that which stands against, [daßnämlich dieser [der Gegendstand] als dasjenige angesehen wird, *was dawider ist*,] so that our [objects of] knowledge will not be haphazard or arbitrary, but rather *a priori* *and surely determined / and determined through sure procedures* [sondern a priori auf gewisse Weise bestimmt sind] […]." (My underscoring)

While the necessary content of knowledge is attributed by Kant to the *a priori* activity of synthesis, the *content itself* cannot but come from experience; and while our *representation* of this experience is dependent on our faculties, all what is in the content of the representation which does not come from the *a priori* activity of unification – all *diversity* in our representations – comes from this

[1] Kemp Smith translates *was dawider ist* with "that which *prevents*;" his translation flows better, but it risks to obscure what seems to me the very important way in which the object prevents our knowing activity from going astray, namely by standing against it and resisting it. Moreover, Kemp Smith translates "auf gewisse Weise bestimmt" with "some definite fashion;" again, his translation flows, but if it is true that in spoken German "auf gewisse Weise" can well mean "in a certain way," "gewiss" also means "sure," "certain," and Kant says how representations are to be determined just after the passage quoted above: they not only have to refer to an object which resists, but also they have to refer to it *necessarily*, and this necessity cannot come from the empirical experience of the object but must come from the activity which *unifies* the different perspectives on the object into a unique concept of the object. This activity is "the formal unity of consciousness in the synthesis of the manifold of representations" (A105).

aspect of resistance which we cannot know in its own but which our representations carry together with their very appearance.
I cannot fit an analysis of the concept of "necessity" into the scope of this talk; for now, let us briefly press further the notion of reality as that which opposes resistance. Is it the case, from what just stated, that only present representations, compelled upon us by the external resistance, can be called "real"? In Section 6 of the Antinomy of Pure Reason Kant offers an answer to this question (A493/B521):

> "Nothing is really given to us save perception and the empirical advance form this to other possible perceptions. […] To call an appearance [*Erscheinung*] a real thing prior to our perceiving it, either means that in advance of experience we must meet with such a perceptions, or it means nothing at all."[2] (My underscoring)

Kant's answer is that a representation is real if it is object of actual or possible experience, i.e., if it is either met in the present or will be met in the progress of experience. This is the only meaning that can be attached to the predicate "real" when referring to a phenomenon. (Kemp Smith translates "Erscheinung" with "appearance," which is not wrong but a bit confusing).
It could be objected that Erscheinungen and Vorstellungen are not precisely the same thing; with the first the emphasis is on their appearing to us, with the second on our active representation of them. Moreover, the two passages come from very distant parts of the *Critique*, and are taken out of two different contexts, the first of which was also entirely rewritten in the second edition of 1787.
These objections notwithstanding, it seems to me that, for the purposes of our present discussion, the differences between Erscheinung and Vorstellung are negligible. I am happy to receive comments on this as well.
In sum, at least two fundamental attributes of reality can be found in Kant's first *Critique*:
1st, reality is what resists our opinion and furnishes the different contents of our representations;
2nd, reality is what is the object of actual or possible experience.
Both these attributes can also be found in Peirce's definitions of reality, although there are of course important differences. To start with, Peirce's account of reality following these two directions is much more explicit. A statement encompassing both aspects of reality is found in Peirce's 1868 paper "Some Consequences of Four Incapacities Claimed for Man" (EP1: 52):

> And what do we mean by the real? It is a conception which we must first have had when we discovered that there was an unreal, an illusion; that is, when we first corrected ourselves. Now the distinction for which alone this fact logically called, was between an *ens* relative to private inward determinations, to the negations belonging to idiosyncrasy, and an *ens* such as would stand in the long run. The real, then, is that which, sooner or later, information and reasoning would finally result in, and which is therefore independent of the vagaries of me and you. (My underscoring)

This definition of real entails two aspects. One is rather epistemic, in that it defines the real as what will be eventually known, subjective biases and "idiosyncrasies" notwithstanding. The other is rather existential, with its emphasis on the resistance and on the constraining character of the real: in this passage, the real simply "stands in the long run," but the effect of this standing is a constant influx and constraint on our understanding. By the end of his life, Peirce seems willing to separate these two aspects of reality – the convergence of opinion upon it and the resistance to our attempts at modifying it – in "reality" proper and "existence." In the

[2] A493/B521: "Uns ist wirklich nichts gegeben, als die Wahrnehmung und der empirische Fortschritt von dieser zu anderen möglichen Wahrnehmungen. […] Vor der Wahrnehmung eine Erscheinung ein wirkliches Ding nennen, bedeutet entweder, daß wir im Fortgange der Erfahrung auf eine solche Wahrnehmung treffen müssen, oder es hat gar keine Bedeutung." My underscoring.

1905 writing "Pragmatism," Peirce writes:

> …*reality* means a certain kind of non-dependence upon thought, and so is a cognitionary character, while *existence* means reaction with the environment, and so is a dynamic character…

To "reality" seems to be left the connection with truth, whereas "existence" emphasises the relation with action (and being acted upon). In the 1907 preface to the projected book on Meaning, Peirce writes (MS R637:27):

> …Real is the proper contrary of Illusion, Delusion, or Figment, while to *exist* means, by virtue of the *ex* in *exsistere*, to act upon, to react against, the other things that exist in the psycho-physical universe.

The reference to illusion seems to point back to the very different context of the 1868 paper; however, the two senses in which something can be said to be real or to be existing are here clearly distinguished. I do not think that, by this distinction, Peirce arrives at disconnecting the notions of reality and existence. I am happy to discuss this point; my impression is that Peirce is aspiring at a better terminological distinctions for two aspects which are nonetheless both part of the meaning of reality. Moreover, the aspect of "acting upon," "reacting against" which characterise all objects "in the psycho-physical universe" was conveyed since the beginning of Peirce's philosophical reflection via his doctrine of categories ("On a New List of Categories," 1868). The categories for Peirce are not functions of our understanding but of reality itself, although the "outer" reality will not be a metaphysical substance entirely different to mind.[3] The second category is that of "sheer resistance" or "outward clash" which is described in 1905 and in 1907 by the analysis of the term "existence."

2. Reality in sensation: feeling

After the Transcendental Deduction(s), Kant moves on with the second book of the "Transcendental Analytics," the "Analytics of Principles," which is divided among the exposition of the theory of schematism and of the "System of all principles of pure understanding." In these second part we find the "Anticipations of Perception" section, where Kant discusses whether there is some other ground for the reality of phenomena apart from the fact that they are presented to us through the forms of intuition (time and space):

> "Appearances [*Erscheinungen*], as objects of perception, are not pure, merely formal, intuitions, like space and time. […] Appearances contain <u>in addition to intuition the matter for some object in general</u> (whereby something existing in space or time is represented); <u>they contain</u> […] <u>the real of sensation</u> as merely subjective representation, which gives us only the consciousness that the subject is affected, and which we relate to an object in general." (B208; my underscoring).

Appearances (or phenomena) are given in space and time but contain as their matter something that is not reducible to the forms of intuition. This matter, taken in its own, is a purely intensive quality;

[3] Peirce 1892, "The Law of Mind," *The Monist* 2, now in EP1: 311: "...what we call matter is not completely dead, but is merely mind hide-bound with habits."

the specific features of such a quality "can never be known a priori," and are therefore a product of experience; but what is common to all sensation – and what can therefore be *anticipated* before a sensation is actually produced in experience – is that this sensation will come *in a certain degree.* Reality can be seen, at this point, as that which comes in a certain degree >0, and its negation as the emptiness of sensation, i.e., degree =0. Kant writes:

> "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 phenomenon*); what corresponds to its absence is negation =0. […] Between reality and negation there is a continuity of possible realities and of possible smaller perceptions."

Kant is developing a theory that allows the real to be present to us as the content of perception. The general element that is in any intensive perception is the *degree*; accordingly, phenomena or appearances are a function of the varying intensity of the qualitative element of perception, which can approach the nothing with infinitesimal steps, but which will never reach it. In this regard, the sensation =0 *is* the absence of reality in sensation, the empty nothingness; but it is only introduced as the *limit* of our sensation of reality, not as a thing existing in its own. (Besides, since every thing is only for us, the nothing, quite simply, cannot be).

This section 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 [gefühlt], 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.[4] (My underscoring).

In this passage, 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, an it is the only element of perception that is possible to anticipate *a priori.*

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), an established scientist with great interest for the philosophy of Schelling and for the problem of measuring sensations. Becoming obsessed with the idea of furnishing a mathematical rule for linking the physical and the psychical elements in sensation, Fechner developed (starting from the experimental results of Ernst

[4] HKA 1:5:249. English translation by Harris and Lauchlan 1988: *Ideas for a Philosophy of Nature as Introduction to the Study of this Science, 1797. Cambridge* University Press. Emphasis added.

Heinrich Weber, but with the crucial mathematical help of his brother Wilhelm Weber) a law which could put the two together into a function. The intensity of a psychical quality, i.e. the sensation occasioned by the stimulus is thus a function of intensity of a physical quality, i.e. brightness or pitch or weight, times a constant *k*. This law is called *Unterschiedswelle*, i.e. Just Notable Differences (JND), also known today as the Weber-Fechner law.

Fechner's work on the JND attracted Peirce's attention as early as 1869.[5] In July 1869, Peirce wrote to his father Benjamin a note accompanying his copy of Fechner's *Elemente der Psychophysik* [Elements of Psychophysics], where he singled out for his father's attention the methodological sections of the book, which are the sections related to the technical exposition of the JND law. Peirce even introduced the JND law in his *Photomtric Researches* (1878) to reduce error in the measurement of the brilliancy of the stars. However, he did not adopt it uncritically, and already in 1878 it is possible to see the germs of criticism that will grow into a thorough criticism of the JND law in 1885.[6]

I am not going to illustrate the experiment in its technical details, but will expound its aims and results. It would be interesting to link them to the 1892 paper "The Law of Mind," to see how Peirce eventually takes a distinct position from that of Kant, criticising directly the notion of continuity expounded in the "Anticipations of Perception" and elaborating a metaphysical account of time and consciousness. For the purposes of this talk, however, I need to limit myself to the 1885 experiment.

The core aim of the 1885 experiment was to challenge Fechner's law in two respects. Firstly, it was claimed that the law did not describe the actual relation between intensity in the external stimulus and intensity in sensation, but that it just assessed our ability to discriminate (in judgment) between sensations. Secondly and related to the first, the notion of a threshold in sensation introduced by Fechner's law had to be restricted to conscious sensation only. Since Fechner's results were based on conscious reports of the experienced differences in sensation, nothing prevented sensation to actually change continuously with the change in the stimulus intensity, but to be only *perceived* as changed after a certain threshold was crossed, i.e. perceived by degrees. From Fechner's experiments, Peirce argues, something could eventually be learned about the ability to make comparisons and the grade of accuracy this ability could possibly reach. However, Fechner's method said nothing about what was actually perceived, or about how the process of perception drew on the received stimuli. From Peirce's epistemological perspective, the possibility to assess what goes on in sensation before judgement means that the laws of perception enable us to account for the subjective distortion of perception in the individual. In challenging Fechner's law, Peirce has therefore a philosophical as well as cognitive interest in the possibility of objective knowledge as distinct from its subjective apprehension. Moreover, he wants to move a methodological objection to Fechner and to suggest therefore that his threshold is actually an artifact of Fechner's way of analysing data. The idea behind this was that many stimuli, while not being consciously intuited, are nonetheless elaborated in sensation.

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5 Fisch 1986: 119; Fisch's source is Peirce's correspondence.

6 Peirce's criticism is directed to the step-like reading of the relation between stimuli and sensation which the JND law entails: according to Fechner, only after increasing over (or decreasing under) a certain "threshold" the change in stimulus reaches sensation. In Peirce's words: "If a certain force *x* applied to irritate a nerve produces a certain sensation, there is perhaps no addition to it δx 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*." *PhR* (1878: 5). For more comments on this, see my "Experimental Psychology and the Practice of Logic: Charles S. Peirce and the Charge of Psychologism, 1869-1885," *European Journal of Pragmatism and American Philosophy*, forthcoming.

According to Peirce, a work of unconscious comparison between the stimuli is performed in sensation before its result reaches consciousness and is expressed in judgement. This thesis can be traced back to Peirce's early writings of 1868. In 1885, Peirce could defend it experimentally by showing that the judgements follow the statistical law of error even in cases in which they are pronounced with confidence = 0. As Peirce writes,

> [according to] the method of least squares, […] the multiplication of observations will indefinitely reduce the error of their mean, so that if of two excitations one were ever so little the more intense, in the long run it would be judged to be the more intense the majority of times.[7]

If indeed there is an unconscious sensory discrimination between very small changes in the stimuli intensity, and if the conscious judgement is the result of a process of comparison and synthesis between small differences of sensation, this unconscious discrimination should be observable as affecting judgement in the long run. On the other hand, if, as Fechner's law maintains, there is a threshold beyond which no stimulus is perceived, the answers to stimuli below a certain limit intensity L should be purely random; that is to say, 50% wrong and 50% correct answers.

The results of Peirce and Jastrow are that, when undecided answers are *not* distributed equally between right and wrong cases and the subject is forced to pick an option and formulate a judgement, her answer would be right slightly more often than wrong ("three times out of five"[8]). This suggests that the difference between stimuli is in fact perceived even when we are unable to examine it consciously, and that its effect can be indirectly observed in the subsequent behaviour of the subject: not knowing why, she answers correctly.

This result is important in light of Peirce's philosophy because the 1885 experiment frames perception as an activity of comparison. A stimulus is not perceived in isolation, but always as "lesser" or "greater" in a set of stimuli. The unconscious process which informs the subsequent judgement is not to be seen as an unconscious effect of the singular stimulus upon the senses, but as an unconscious inferential activity from a multiplicity of stimuli flowing in time. This result is possible, I believe, because of the Johns Hopkins' investigations on nervous action as well as because of the familiarity with Kant and post-Kantian philosophers that Peirce had since his youth.

Reality: an *a posteriori* enterprise?

In conclusion, Peirce's need of psychological investigation can be only understood in the framework of his philosophical and metaphyiscal project. Kant can do without psychology because his constructivism is *a priori*; Peirce on the other side needs to show how the *mannigfaltigkeit* of sensory data can be unified in a synthesis which is to be performed by our faculties but which cannot be justified by them. The culmination of the *a posteriori* project of Peirce is perhaps to be seen in the psycho-physical experiment "On Small Differences of Sensation" published with Joseph Jastrow in 1885. However, psychological experiments cannot replace philosophical reflection entirely. My hypothesis at this stage of research is that Peirce will shift the burden of proof from the transcendental constitution of our faculties to the logical analysis of inference, which is a structure working across the different domains of psychology and logic. Peirce does not give a systematic account of inference in perception; there are however enough elements to argue that Peirce saw the

[7] W5: 123.
[8] W5: 135.

physiological work performed by our nervous system as a kind of inference, more precisely an unconscious inference.

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