Frederik Stjernfelt

The generality of signs: The actual relevance of anti-psychologism*

Abstract: The aim of this paper is to make a concise presentation and comparison of classical anti-psychologism in the semiotics of Peirce and Husserl in order to actualize anti-psychologism for current semiotic studies. A reason why this seems again necessary is the introduction of cognitive science and the neurosciences in semiotics. This is not to claim that this development necessarily leads to psychologism. The important study of the relations between semiotics and cognition and the many investigations of how the brain and mind process sign use form central and important parts of actual semiotics; yet, the oblivion of anti-psychologism may, in some cases, lead researchers to assume untenable dreams of the complete reduction of things semiotic to psychology, thereby unknowingly repeating late nineteenth century cul-de-sacs of psychologism and leading to erroneous or exaggerated interpretations of experimental findings.

Frederik Stjernfelt: Aarhus University. E-mail: semfelt@hum.au.dk

1 Introduction

Anti-psychologism is basic for semiotics as such. During the founding period of modern semiotics in the decades around 1900, the refusal to take signs to be reducible to psychological phenomena was crucial for the establishment of logical and semiotic phenomena and structures as autonomous objects of research. Thus, it plays center stage in Peirce, Frege, and Husserl; the three of them forming a virtual Trinity of anti-psychologism. It is well known how the anti-psychologism of Frege fed into the nascent currents of formal logic and analytical philosophy from the late nineteenth century onwards. It seems more exposed to oblivion, however, how the very notion of signs and semiotics as domains of research crucially depends on anti-psychologism.

2 What is psychologism?

What is this "psychologism" that anti-psychologism takes as its critical target? Narrowly taken, it is the idea that logic is the study of how minds and brains behave while thinking[1] – more generally, it is the idea that the content and structure of thought and signs form part of the domain of psychology – so that the study of minds and brains forms the primary or even the only way of accessing these issues. A basic problem in psychologism is that it immediately allows for relativism. If one mind holds one thing to be true while another prefers another, who are we to judge, when psychology is taken to be the deepest or even the only access to those claims? Psychology studies psychic processes in general with no distinction as to whether particular claims made by those psyches are true or false, and the truth or falsity of a claim may not be decided from investigating the psychological process bringing forth that claim. To make a caricature: If mathematical entities were really of a psychological nature, then truths about them should be attained by means of psychological investigations. The upshot of psychologism would thus be that a proper way of deciding the truth of the claim that $2 + 2 = 4$ would be to make an empirical investigation of a large number of individual, psychological assessments of that claim. So, if we amass data of, say, 100.000 individual records of calculating $2 + 2$, we might find that a small but significant amount of persons take the result to be 3, which would give us an average measure of around 3.999 as the result. This might now be celebrated as the most exact and scientific investigation yet of the troubling issue of $2 + 2$, far more precise than the traditional, metaphysical claims of the result being 4, which must now be seen as merely the coarse and approximate result of centuries of dogmatic mathematicians indulging in mere armchair philosophy and folk theories, not caring to investigate psychological reality empirically.

Another implication of psychologism may be that signs and their meaning are nothing more than the individual psychic or neuronal phenomena supporting them or associated with them. This makes it difficult to describe the majority of signs that are repeatable and thus assumed to be identical from one use to the next. For how could two different mental experiences be assumed to be identical? Thus, the meaning of a word in a language may be taken to be the sum or average of the set of individual mental representations of that word's meaning (something similar goes for the acoustic or graphic image of the word, which is also

---

1 "Psychologism" in English is the translation of German *Psychologismus*, which was invented in 1870 by Johann Erdmann to characterize the work of Eduard Beneke (Kusch 2007). Subsequently, the term became commonplace in the *Psychologismusstreit*, the struggle over psychologism, in German academia around 1900.

identically repeatable or multiply realizable).[2] An immediate problem in such a conception is that an object to which we have fairly direct access – word meaning as accessed by linguistics, dictionaries, encyclopedias, public definitions, introspection, action, intersubjective agreement in everyday speech – is replaced by an object to which we have no access (or very limited access), namely, a sum of different bundles of associations in the minds of a vast array of individual persons. This problem holds for the scientific study of meaning: how are we to establish the meaning of a lexeme if it consists of millions of vague, fleeting, instantaneous, mental events that we are only able to address via the insecure roundabout way of trusting people's own introspective reports about their mental experiences? And the same problem holds for the individual language learner's access to word meaning: the user has even less access to the myriad of mental events in other persons' heads assumed to constitute word meaning; how could we ever learn language if the prerequisite was the child's summing up of many other persons' psychic imagery? Anti-psychologism in semiotics has approached this conundrum by claiming that the expression, the content as well of the reference of semiotic structures cannot be thus reduced to individual mental representations. Rather, the sign vehicle, its content, and reference are seen as objective types that may, in turn, give rise to widely differing mental associations in the single sign user without those associations being central to the objectivity of the sign. Thus, the fact that yours truly is a synesthete and imagines the equation $2 + 2 = 4$ as involving two light blue "2" digits and a claret red digit "4" has absolutely no bearing on the fact that the meaning and reference of that equation is exactly the same as in another individual who may associate the very same general state-of-affairs with other colors or with different imaginary means such as Roman numerals, two dots alongside two dots or any other mental way of adorning that basic fact.

3 Classic anti-psychologism

3.1 Husserl's anti-psychologism

Let us begin with Husserl's anti-psychologism, which gave birth to the whole movement of European phenomenology, taking the objective description of ideal structures[3] – whether intended by a mind or not – as its object.

---

2 The fact that word meanings may vary from one context of use to another forms another issue that must not be confused with psychologism.

3 Many people immediately frown when faced with the notion of "ideal" and "ideality." The wording is not important, notions as "typical" or "general" may just as well be used; "ideal" in Husserl's sense of the word does not in any way imply subjectivism, quite on the contrary.

A well-worn myth in the history of philosophy tells us that it was Frege's scathing review of Husserl's first book *Philosophie der Aritmetik* (1890) that prompted Husserl to a volte-face, repudiating his earlier psychologism in favor of the staunch anti-psychologism of *Logische Untersuchungen* (1900–1901) whose 300-page Prolegomena counts as Husserl's major statement against psychologism.[4] A strong case can be made, however, that Husserl was never a psychologist and that the parts of *Philosophie der Aritmetik* mistaken for psychologism rather aimed at establishing an epistemology of numbers, not the psychological reduction of them (Husserl 1970b).[5] In any case, the attacks prompted Husserl to introduce *Logische Untersuchungen* by his most thorough statement against psychologism, a statement that proved central to the ensuing debate over psychologism in the first decades of the twentieth century. Figures attacked for psychologism in the Prolegomena include Eduard Beneke, Benno Erdmann, John Stuart Mill, Christoph Sigwart, and other logicians, and the main line of arguments in his refusal of psychologism runs as follows.

The Prolegomena embeds the criticism of psychologism in the outline of an ambitious and important theory of science, the central argument of which is that any science forms a body of knowledge expressed in propositions that, in turn, are connected to form a theory by means of logical relations holding between them. Thus, logic constitutes a basic prerequisite to any science. This implies, on the other hand, that the theoretical doctrines of the single sciences are never, in themselves, complete (§5). They require completion through this doctrine of a theory of science (*Wissenschaftslehre*) as well as a metaphysics (in the sense of a doctrine accounting for the basic concepts and entities of the science in question). The latter two require that a science must constitute a unity given by the

---

4 Kusch (1995) provides a detailed account of the *Psychologismusstreit* in German philosophy and psychology up to 1930. A social constructivist, Kusch attempts to find the roots of the controversy in fights for university chairs between the two sciences, and he even sides with psychologism for the basic reason that it forms an ally to his own sociologism, both of them willing to reduce the issue of truth to the relativity of psyches and societies. His final argument – that the victory of anti-psychologism in the 1920s was due to the antiscientific welding of phenomenology with Lebensphilosophie in order to fit the irrational "Weimar mentality" – completely overlooks Husserl's stance against Lebensphilosophie, also in its phenomenological guise in Heidegger. Even worse, it overlooks that irrationalist vitalism more often sides with psychologism than with anti-psychologism. Still, the book is highly valuable, not only does it give a useful and detailed comparison of Frege's and Husserl's anti-psychologisms, it also gives a detailed overview over the wide variety of positions on the psychologism issue among different contemporary schools of philosophy and psychology. Peirce, outside of these European struggles, is not mentioned.

5 See Smith (1978).

system of propositions it embraces (§6). Only a few of these propositions, how-ever, facilitate immediate evidence, and other propositions regarding other states-of-affairs more remote from experience must be logically founded on those evident propositions. Thus, logic linking all the propositions of a discipline to-gether forms a basic, normative tool of science; a tool that must be, in turn, based on logic as a descriptive doctrine. This meta-scientific prolegomena to the Prole-gomena is important for its insistence on the role of logical normativity in any science whatsoever, and it forms the frame of the whole psychologism refutation as Husserl returns to this theory in his conclusion. Some combinations of propo-sitions are logically valid, others not so, and this validity cannot be established psychologically, because psychology indiscriminately studies psychic processes without regard to the validity of their claims.

Husserl's argument, however, differs from ordinary arguments against psy-chologism, he claims. They include the distinction between normative logic and descriptive psychology as well as the circularity argument: psychology depends upon logic, hence it cannot found the study of logic (Lotze, Stumpf). Husserl does not embrace these arguments (§19): he refuses to accept the characterization of logic as being normative only, and thus the former piece of anti-psychologism may be repudiated merely by taking logic to form a very special subset of psychol-ogy. The latter may be rejected by admitting that psychology does indeed use the rules of logic, but does not take logic as a premise (a scientist may proceed logi-cally without explicitly relying upon logic, just like the painter does not need to be an expert on aesthetics). The latter part of this argument Peirce would also embrace with his distinction between use-oriented *logica utens* and the explicit study of logic in the *logica docens*. Husserl takes this to imply that only if the sci-entist argues *from* logic, not *with* logic, a circulus vituosis appears.[6] The validity of this argument seems doubtful, however; even if the artist does not explic-itly know aesthetics, his practice tacitly presupposes it to the extent that he must conform to it; the degree of explicit, conscious knowledge in the subject cannot be decisive for the logical relations between the claims he makes or the phenomena they address. Degrees of consciousness are a psychological issue and cannot decide logical issues (cf. Husserl himself on this issue in §23, below).

---

6 It may be argued, though, that the degree of explicitness to which logic is taken as a premise, should not play a role for the issue of a possible circulus vituosis. Science presupposes that the arguments of a theory may be checked by any other well-informed scientist; the ideal, logical stability and repeatability of the theory is presupposed in such an idea. If a scientific theory was merely a vague, approximate, subjective content, ever-shifting in its wandering from one mind to the next, one scientist would be unable to control the other's work.

The vagueness of this argument is also evident from the fact that Husserl does not otherwise refrain from using the circularity argument.

Husserl's own arguments take another direction with a pre-Popperian argument attacking the empiricist implications of psychologism. Psychological regularities are empirical laws and thus necessarily inexact, which is why they fail to form the base of support for the exact laws of logic: Induction is never able to prove the validity of a empirical law, only its probability (§21).[7] Second, psychologism confuses logical laws in themselves with the psychological acts of judgment using those laws; a confusion of the ideal and the real, the distinction between which becomes crucial to Husserl's overall argument. Thus, a proto-Searlean argument: a computer does not understand its own calculations; their logical validity does not depend upon whether they are accompanied by conscious acts of judgment.[8] Third, if logical regularities were, as claim the psychologicists, natural laws of the mind, they should have a psychological content and presuppose the existence of minds. But no logical law implies the existence of any matter of fact. We cannot pass from any truth of logic (or mathematics) to the existence of any empirical fact, be it in psychology or elsewhere. Unlike the ideal truths of logic and mathematics, the general laws of the empirical sciences are idealized fictions *cum fundamento in re* (§23).

A large argument bearing on the real-ideal distinction is devoted to the Law of Contradiction as it is explained in different psychologicists, Mill, Sigwart, F. A. Lange, Herbert Spencer, psychological renderings of Kant, etc. (§25). Contradiction cannot be explained by the (claimed) empirical impossibility of minds to have mutually exclusive experiences at the same time, for that description presupposes the idea of mutual exclusivity, which is the same as contradiction. This issue leads Husserl to an important observation regarding empiricism (§26): the belief in nothing but singular empirical propositions bars it from even defending its own principles, because it rejects the important possibility of reaching mediate knowledge from immediate knowledge. It thus confuses the origin of knowledge with its legitimation (*Genesis* and *Geltung*, as it were) as Reichenbach was later to distinguish in his famous contrasting context of discovery, namely, context of justification.

---

7 Kusch (1995) refers to Moritz Schlick for the counterargument that if logic is indeed a part of psychology, then psychology eo ipso does contain exact laws, namely, those of logic. This, of course, raises other issues, such as why these could then be the only empirical laws without inexactitude.

8 Husserl's argument is that the logical validity is independent of the presence or absence of consciousness accompanying the process; Searle, of course, makes the same argument with another aim, that of arguing against the claim that ordinary computers may have conscious states.

1   The example of syllogisms is important (§30), few psychologists venture into
2 a psychological version of them, because any fallacy would immediately count as
3 a counterexample: if logic was really a "physics of thought" (Th. Lipps), any per-
4 son committing a fallacy would reject the validity of logic.
5   Husserl's most crucial point against psychologism, however, is that it leads to
6 relativism or skepticism as argued in his conclusive return to his basic theory of
7 science (§32). Theory-construction, according to him, has two basic, correlative
8 sets of conditions of possibility: a) subjectively: the experience of evidence, the
9 ideal presuppositions for the possibility of immediate and mediate knowledge
10 and their legitimation in any possible knowing subject whatever; b) objectively:
11 the set of propositions of the theory and the logical inference structure binding
12 them together. If the possibility of either of these is denied, we are left with vari-
13 ants of skepticism. The refusal of the former leads to noetic skepticism, the re-
14 fusal of the latter leads to logical skepticism (no knowledge is possible; no truth
15 is possible, respectively), both of which are inherently contradictory, because
16 they form theoretical doctrines denying the possibility of true theories. Again,
17 these skepticisms must be distinguished from so-called "metaphysical" skepti-
18 cism that is not thus contradictory, but that denies the possibility of knowledge of
19 certain realms of reality, an example being Kant's refusal of knowledge of things-
20 in-themselves to be possible.
21   Relativist psychologism may take the shape of noetic or metaphysical skepti-
22 cism; in both cases claiming that truth and knowledge is always relative to the
23 judging subject. Such relativism comes in two variants, depending upon its no-
24 tion of subject. An individual relativism may ensue, tied to the subjectivity of the
25 single person and with solipsism as the result, or a specific (species-related) rela-
26 tivism focusing on the idea that any species of judging beings possess their own
27 set of thought-laws (§34), admitting "truth for this and that species" only. The
28 former is quickly dealt with by a variant of the classic argument against solipsism
29 for being self-refuting. The latter is taken more seriously, more scientific-seeming
30 as it is, referring to the knowledge structures of whole species, particularly hu-
31 man beings. This is characterized as "anthropologism" as the anthropocentric
32 claim that knowledge and truth are relative to the human species.[9] The basic
33 argument against it is that the same content of thoughts cannot be true and false
34 at the same time no matter whether expressed in different thought-laws or lan-
35 guages or not. So there are only two possibilities: either other species use words
36
37 ──────────
9 This central argument was already in Peirce (below), and crops up again in cognitive science:
38 Clark (2008: 93) warns against "anthropocentrism" and "neurocentrism" where accidental
39 aspects of human neural cognition are taken to be basic properties of cognitive processes in
40 general.

corresponding to "true" and "false" in a way like us or they use the words differ-
ently, and then it is a strife about words. The problem in the "anthropologicist"
argument is that the existence of the human species is a fact, and from facts come
only facts. If truth had its origin in the constitution of human beings, no truth
would exist without man, and the relativity of truth would entail the relativity of
the existence of the world, that is, make science impossible.[10]

Psychologism, in all its forms, now constitutes such a relativism (§38). Sig-
wart, again, is taken as an example (§39): for him it is a fiction that a truth may be
true without anyone thinking it. But then Newton's Second Law would not be true
before Newton, Husserl argues: Truth is not a subjective phenomenon. Any truth
is a unity of validity in the a-temporal realm of ideas, and you cannot at the same
time relativize truth and maintain the objectivity of being, because the two of
them are correlative. Similarly, Erdmann imagines a super species of thinking be-
ings might exist whose highly sophisticated concepts would be as alien to us as
ours are to our children, and their logic would be both superior to ours and unin-
telligible to us. Husserl's counterargument: even such supermen would be bound
by the law of contradiction and by logic and mathematics in general.

Thus, the set of three basic prejudices of psychologism is listed (§41): 1) *The
idea that prescriptions for the regulation of psychic processes are themselves
psychologically grounded*. Against this, rules for norms must be distinguished for
what is governed by those norms. Concepts like truths, sentences, subject/
predicate, implication, etc., are general norms prerequisite to any science and
must be distinguished from empirical norms inherent in instruments and tools
related to the human being scientists.

2) Second prejudice (§44): *Logical concepts are psychic formations.* If that
were true, the whole of mathematics would become a mere branch of psychology.
But even if we cannot access numbers without counting, sums without addition,
products without multiplication, nobody would say that mathematicians are psy-
chologists. The act of counting is located in space-time, but the ideal form type of
a number is nothing existing in time and space, and the former is a psychological
tool for grasping the latter. An important observation here is that *Vorstellung*
(idea) is a misleading word since it tacitly presumes that all objects of the mind

---

10 Kusch (2007) claims that Husserl here and in the following confuses truth and reality. Husserl
indeed seems to vacillate between taking truth to be the correspondence relation between a
proposition expressed in a sentence and a state-of-affairs on the one hand, and to simply be
those states-of-affairs on the other. If it is taken to be the former, then it is correct that truths did
not exist before man or other species uttering sentences, even if the reality referred to did exist.
This, however, seems to be a strife of words, and it seems evident Husserl's position may be con-
sistently redescribed using either of the two truth definitions.

share an equally psychic character.[11] Here, specifically logical concepts are not psychic or mental rather, they are the *objects* of mental acts, just like external objects are not parts of the mind. So this prejudice tends to make invisible an important tripartite distinction: that between 1) the psychic connections between mental experiences; 2) the real connections between theoretically known states-of-affairs; and 3) logical connections between propositions and distinction between connections in mind, reality, and logic, respectively.

3) A third prejudice (§49) is that *All truth lies in judgment*. But we only recognize a proposition as true due to its evidence. And evidence is not merely a psychological feeling. There are non-mental ideal conditions for evidence: "the experience in which a judging person realize the truth of his judgment, its suitability to truth" while the task of psychology, by contrast, is to study the natural conditions for evidence: degrees of concentration, alertness, practice, etc.[12]

The decisive lesson is thus the distinction between real and ideal (§51). Any proposition involves claims of meaning and validity and it would be absurd to split up the concept into some extension of single cases. Truth is the idea of a fit between the meaning of a proposition and a state-of-affairs; and evidence is not a mere psychological feeling, but the experience of this very idea. The distinction between real and ideal gives two types of truths (§63): individual truths pertaining to real existence on the one hand and general truths on the other.[13] The concrete sciences addressing facts must attach to the lower principles of the nomological and abstract sciences.[14]

---

11 John Deely (2001) argues that it is the appearance of the notion of "idea" in both empiricism and rationalism in early seventeenth century that leads to the strange fact that at the same time as modern realist science is born, modern anti-realist, nominalist epistemology sees the light. To Deely, "idea" unfortunately replaces "sign" with its ineradicable connection to referent objects.

12 It is well known that Husserl was himself attacked for psychologism in the *Logische Untersuchungen*. One reason was his doctrine of intentional acts in the fifth *Logische Untersuchungen*, another was his reference to evidence in his truth theory. He does not, however, identify evidence with a psychological feeling but with the experience of an ideal fit between a claim and a states of affairs.

13 It is important to add that general truths may have very different types of objects. The prototypical case, as it were, is logical and mathematical truths, referring to ideal objects with no amount of factual matter involved. Another set is general claims about matters of facts, e.g., laws, patterns, tendencies, universals, properties charted by science or everyday knowledge; these may even come in two types, material ontological concepts like matter, organism, society, language, etc., and empirical universals like bacteria, elephants, telephones, etc. A third set is general claims about restricted universes of discourses, such as thought experiments or fictions, such as addressed by Husserl's important pupil Ingarden, see Stjernfelt (2007: ch. 17).

14 A section critically addresses the then current idea that logic are techniques of thought economy only; we skip these arguments as they do not add much to the central issue of psychologism.

Science is, at one and the same time, an anthropological unity of thought acts and thought dispositions and external arrangements on the one hand, involving psychological states, and, on the other hand, an objective, ideal connection between truths. Truth is the ideal correlate of the fleeting subjective acts of knowledge in different individuals in time and space (§62). We may say, using later terminology, that the former has multiple realizability in different subjects and may thus be incarnated in many different particular versions of the latter. This is why the a priori study of real possibilities – cut off from all connection to particular thinking subjects and the idea of subjectivity – may be accomplished. Such real possibilities may then, in turn, be applied on empirical single cases (§65).

A theory, ideally conceived of, just consists of logically connected propositions. This characterization finally opens the vista for an ambitious "Theory of theories": if all "givenness," all material/empirical content, is erased from a theory, its pure logical skeleton form will remain (this is taken to be the procedure by which notions like concept, truth, sentence, subject, predicate, etc., have been isolated in the first place). To these concepts of logic, concepts of formal ontology may be added, which pertain to any sort of object domain whatever: concepts like object, state-of-affairs, unity, plurality, number, connection: formal categories of objects (§67). Thus, different possible theory structures can be investigated and one may be transformed into the other by the controlled variation of certain factors so that any particular theory ideally may be assigned to a form class among other form classes of theories (§69).

The object correlate of these pure theories is what Husserl calls "the theory of multiplicity" (the integration of recent results of general mathematics: general geometry, the topology of Grassman and Hamilton, Lie group theory, Cantorian set theory, etc.) on the object level. The important upshot of this idea is that the content of all theories are taken to contain mathematical structure, simple or complex, implicit or explicit; so that all empirical theories form material specifications of parts of this "theory of multiplicity." Perceptual judgments – the bread and butter of empirical science – are thus taken to be integrated into theories governed by the ideal norm of the unity of science facilitated by logic (§72).

Thus, Husserl's overall argument is that psychologism in logic leads to relativism and consequently to the impossibility of science while the theory of science proves the necessity of scientific theories to be carried by logic. With the focus upon logic (and mathematics) in the Prolegomena, Husserl's anti-psychologism may seem not to have a direct bearing on semiotic issues more broadly conceived. This is not so. We do not have the space here to run through its wide consequences in the remainder of the *Logical Investigations*; suffice it to say that anti-psychologism is a guiding light all through the book. In the first Investi-

gation, general signs (*Ausdrücke* as opposed to non-general *Anzeichen*) are inves-
tigated; in the second, an anti-empiricist theory of abstractions (as due to a
change in attitude distinct from the issue of induction) is outlined. In the impor-
tant third investigation, a doctrine of parts and wholes is outlined, and the cen-
tral distinction between formal ontology (holding for all objects) and material
ontologies (holding for the special sciences) is sketched, the upshot being that
the foundation of any science is constituted by the set of dependencies holding
between the specific parts and wholes studied. The fourth investigation applies
this to language, giving the outline of an a priori grammar for any empirical lan-
guage. The fifth investigation, famously introducing Husserl's concept of "inten-
tion," was already during the reception of the book mistaken for reintroducing
psychologism because of its emphasis on subjective intentions; the resulting the-
ory is, quite on the contrary, an outline of a material ontology of any possible
subjectivity, expressed in the dependence ontology of the third investigation. The
long sixth investigation draws further consequences for science and the relation
between the conceptual and perceptual aspects of it. The overall result, then, is
that Husserl's anti-psychologism forms the very basis of his early phenomenolo-
gy and underlines the irreducibility to psychology not only of the central core of
logic and mathematics, but also of a whole array of general phenomena which
may involve mental acts and be addressed by them, such as signs, abstractions,
part-whole structures, grammar, intentionality, and science as such.

When Husserl returns to the issue of anti-psychologism many years later, in
the *Formale und transzendentale Logik*, the basic real-ideal argument of the *Prole-
gomena* is repeated, now phrased in the terminology of the possibility of objects
of mental acts to be numerically identical. I may address exactly the same object
in two different mental acts; such objects must be ideal, as all real objects are
ever changing and never numerically identical. This terminology may be con-
fusing, because "ideal" nowadays is often associated with "subjective." As
should be evident, Husserl's use of "ideal" is almost the opposite. As we shall
see, Peirce would call such entities "generals," others "universals," but it is
important to notice that the same issue keeps cropping up in different guises,
also in current cognitive science. Here, concepts such as "schemata," "coarse-
graining," "insensitivity," "multiple realizability," "abstraction," "types," etc.,
address the same issue: that it is possible for the mind to use signs to address
entities that are not fully determinate without assuming such objects are mere
figments of the mind. The notion of "ideal" may frighten scientists of our day, but
the central idea that cognition relies upon schemata is exactly the same idea
expressed in a different dialect. And that it is exactly because such entities are not
fully determinate that they may be simpler than real objects, allowing for their
identical repetition.

3.2 Peirce's anti-psychologism

It seems considerably less well-known that Peirce was no less an ardent anti-psychologist than were Frege and Husserl. Did he not refer to minds when pragmatically defining meaning as the conceived effects of an idea, and did he not make psychological experiments himself, counting among the first to investigate "subliminal perception" experimentally? Yes, indeed he did, and this goes to show that anti-psychologism is not in any way incompatible with deep interests in profound psychological issues such as the way empirical minds intend ideal entities. Peirce's anti-psychologism even predated not only Husserl's but also that of Frege. It simply formed a central concern already in his very first papers from the 1860s, and it remained with him over the years, even in an increasingly radical form, following the well-known growth in Peirce's realism as traced by Max Fisch in an influential paper (Fisch 1986).[15]

As early as 1865, in the first of his "Harvard Lectures," the young Peirce states "Logic has nothing at all to do with the operations of the understanding, acts of the mind, or facts of the intellect. This has been repeatedly shown by the Kantians. But I will go a step further and say that we ought to adopt a thoroughly unpsychological view of logic . . . " (*W* 1: 164). Peirce proceeded to write a syllogism on the blackboard and insisted on distinguishing between its meaning – its "logical character" – on the one hand, and the different thoughts accompanying individual graspings of it, on the other:

> Now, this has a particular character to me as I write it; it has the same to all of you as you read it; it will have the same if you read it tomorrow. Now is this logical character a form of thought only? My thought when I wrote it was a different event from each one of your thoughts, and your thoughts will be each different if you read it again from what they were when you read it just now. The thoughts were many, but this form was one. (*W* 1: 164–165)

This distinction between individual thoughts and logical form anticipates Peirce's later distinction between existing Secondness and real Thirdness, just as it anticipates Husserl's between real and ideal.[16] Peirce's wording directly points to

---

15 Not much has been written about Peirce's anti-psychologism; Colapietro (2003) reconstructs his general stance on the issue and notices a possible tension with Peirce's embracing "anthropomorphism"; Kasser (1999) argues that Peirce's 1878 pragmatism papers do not deviate from his overall anti-psychologism; Amini (2008) discusses Peirce's argument from logical machines against psychologism.

16 The possibility of terminological confusion is vast, as it appears. Husserl uses "real" about empirical matter-of-fact being where the later Peirce would use "existence." Husserl uses "ideal" about a subset of what the later Peirce would call "real"; general structures of reality.

the relation of multiple realizability between the two: one and the same general logical form may be realized in many different psychological thought processes.

So, in the very papers where Peirce first set the course for his lifelong quest in logic and semiotics, well before the pragmatic maxim of 1878, well before Frege's *Begriffsschrift* of 1879 and his 1884 attack on psychological logic in the *Grundlagen* (Frege 1989), and well before even the coinage of the term "psychologism" in Germany, Peirce emphatically rejected psychologism in logic.[17] It is not our aim here to chart all occurrences of anti-psychologism in the development of Peirce's thought; let us focus upon how anti-psychologism becomes central in the mature Peirce, exactly in the period after the turn of the century when he developed the detailed version of his phenomenology and semiotics. An important line of argument here is Peirce's extension of logic from the formal study of truth-preservation between propositions to a much broader field. This extension is based on the Kantian idea of metaphysics mirroring logic:

> The first question, and it was a question of supreme importance requiring not only utter abandonment of all bias, but also a most cautious yet vigorously active research, was whether or not the fundamental categories of thought really have that sort of dependence upon formal logic that Kant asserted. I became thoroughly convinced that such a relation really did and must exist. After a series of inquiries, I came to see that Kant ought not to have confined himself to divisions of propositions, or "judgments," as the Germans confuse the subject by calling them, but ought to have taken account of all elementary and significant differences of form among signs of all sorts, and that, above all, he ought not to have left out of account fundamental forms of reasoning. (*CP* 1.561, "Vitally Important Topics, Lecture 3," 1906)[18]

Peirce extends the study of logic in two directions, as it were, "downwards" and "upwards"; the former leading him to include the host of different semiotic tools by means of which logical propositions are functioning; the latter leading him to include the scientific linking of propositions in the process of research, studied by "methodeutic," we would rather nowadays call it heuristics or theory of sci-

---

17 Anti-psychologism is even repeated in one of his very last papers, "An Essay toward Reasoning in Security and Uberty" (1913) and thus spans the whole of Peirce's career:

> So, it in no degree conflicts with my admiration of modern psychology that I at once express the opinion that (at least, as far as I am acquainted with it) it can afford no aid whatever in laying the foundation of a sane psychology of reasoning, albeit it has been and can still be of the most precious service in planning and executing the observations on which the reasoning depend and from which they spring. (*EP* 2: 471)

18 I present fairly elaborate Peirce quotes in this section to substantiate my claim that Peirce's psychologism is not inferior to Frege's nor Husserl's, and to give an idea of its original character.

ence. This extension of logic downwards to semiotics and upwards to heuristics
immediately extends anti-psychologism to cover them as well: semiotic struc-
tures, logical structures, structures of scientific discoveries. All of those are acces-
sible independently of the psychology of the particular minds that happen to re-
alize them. So semiotics, logic proper, as well as theory of science are to be
conceived of anti-psychologistically; an important parallel to Husserl, in whom
we also saw basic semiotic issues and the structure of theories as being beyond
psychology. Thus it comes as no surprise when we find him articulating the basic
stance of psychologism in logic and a rejection of it along a similar line as when
Husserl refuses that the exactitudes of logic could be based in the inexactitudes
of psychology:

> It is almost universally held that logic is a science of thought (so far as it is a science at all),
> that thought is a modification of consciousness, and that consciousness is the object of the
> science of psychology. The effect of this, were it perceived, is to make logic logically depen-
> dent upon the very one of all the special sciences which most stands in logical need of a
> science of logic. (MS L75, 1902)

In central papers of this period (such as "Minute Logic" and "Syllabus," both
from 1902, the pragmatism lectures from 1903 and the "Prolegomena for an Apol-
ogy to Pragmaticism" from 1906), his anti-psychologism is developed in detail.
Many of his arguments echo Husserl's[19]; thus, in the "Syllabus," we find Peirce
arguing in parallel to Husserl when stating that intelligible logical structures are
badly explained by referring to much more obscure mental phenomena:

> To explain the judgment in terms of the "proposition" is to explain it by that which is es-
> sentially intelligible. To explain the proposition in terms of the "judgment" is to explain the
> self-intelligible in terms of a psychical act, which is the most obscure of phenomena or facts.
> (*CP* 2.309, n. 1, "Syllabus," 1902)

And just like Husserl, Peirce pinpoints Sigwart's psychological theory of contra-
diction as an especially fragile piece of psychologism. While Husserl argued that
Sigwart presupposed the contradiction he was out to explain, Peirce takes an-
other road; that of dissociating the ever changing tendencies of the human mind
from logical validity. As a fallibilist, he picks the case of Euclidean geometry,
which was perceived as unshakably evident by innumerable scholars over many
centuries until the appearance of doubts about the parallel postulate and the
growth of non-Euclidean geometries. The psychological feeling of evidence per-

---

19 Peirce's scattered references to Husserl and *Logische Untersuchungen* in this period are
mostly pejorative, but some inspiration cannot be precluded. Mostly, it seems as if both of the
two mistook the other for a psychologicist (see Stjernfelt 2007: ch. 6).

ceived by generations of expert Euclid scholars thus formed no guarantee against logical fallacy:

> The appeal to direct consciousness consists in pronouncing certain reasoning to be good or bad because it is felt to be so. This is a very common method. Sigwart, for example, bases all logic upon our invincible mental repulsion against contradiction, or, as he calls it, "the immediate feeling of necessity" . . . Those who think it worthwhile to make any defense at all of this proceeding urge, in effect, that, however far the logician may push his criticisms of reasoning, still, in doing so, he must reason, and so must ultimately rely upon his instinctive recognition of good and bad reasoning. Whence it follows that, in Sigwart's words, "every system of logic must rest upon this principle." It is, however, to be noted that among the dicta of direct consciousness, many pronounce certain reasonings to be bad. If, therefore, such dicta are to be relied upon, man not only usually has a tendency to reason right, but also sometimes has a tendency to reason wrong; and if that be so, the validity of a reasoning cannot *consist* in a man's having a tendency to reason in that way. Some say that the validity of reasoning consists in the "definitive dictum" of consciousness; but it has been replied that certain propositions in Euclid were studied for two thousand years by countless keen minds, all of whom had an immediate feeling of evidence concerning their proofs, until at last flaws were detected in those proofs, and are now admitted by all competent persons; and it is claimed that this illustrates how far from possible it is to make direct appeal to a definitive pronouncement. (*CP* 2.209, "Minute Logic," 1902).

Thus "tendencies" of the human mind may prove wrong even after having persisted for millennia and hence cannot be taken as foundational definitions of logical validity; quite on the contrary, it is the latter that are necessary to investigate the former and that may, in the longer run, prove the former to be mistaken.

In shaping the final versions of his system after the turn of the century, Peirce even admits that his original Pragmatic Maxim of 1878 was coined in too psychological terms, which is why he now rephrases it as a logical principle:

> Thus, when you say that you have faith in reasoning, what you mean is that the belief-habit formed in the imagination will determine your actions in the real case. This is looking upon the matter from the psychological point of view. Under a logical aspect your opinion in question is that general cognitions of potentialities *in futuro,* if duly constructed, will under imaginary conditions determine *schemata* or imaginary skeleton diagrams with which percepts will accord when the real conditions accord with those imaginary conditions; or, stating the essence of the matter in a nutshell, you opine that percepts follow certain general laws. Exactly how far you hold that the percepts are determined by law is a matter of individual opinion. The mere fact that you hold reasoning to be useful only supposes that you think that *to some useful extent* percepts are under the governance of law. (*CP* 2.148, "Minute Logic" 1902)

The Maxim's emphasis on future conduct makes Peirce realize that as all conceptions of the future must to some extent be general, such conceptions must involve

general, schematic, ideal signs whose multiple realizability makes them fit to refer to many related particular future developments. This is in accordance with his idea that symbols are signs with general meaning and whose generality entails they have an *esse in futuro* because they pertain not only to the finite amount of past and present realizations but also to indefinite future realizations of that meaning. Peirce's anti-psychologism thus importantly insists that logic requires of semiotics the involvement of schematic, general or unsatiated signs facilitating diagrammatic reasoning:

> Diagrammatic reasoning is the only really fertile reasoning. If logicians would only embrace this method, we should no longer see attempts to base their science on the fragile foundations of metaphysics or a psychology not based on logical theory; and there would soon be such an advance in logic that every science would feel the benefit of it. (*CP* 4.570, "Prolegomena for an Apology to Pragmaticism," 1906)

Here, an important difference between Husserl's and Peirce's anti-psychologism becomes evident. Husserl, as a mathematician inspired by Weierstrass and Kronecker, was suspicious against diagrams and considered them to form part of the mental imagery connected to the psychological instantiation of reasoning in particular minds and thus forming part of a psychologistic account for logic. Peirce, quite on the contrary, saw diagrams as giving access to pure logical form beyond individual (or species-bound) psychologies. And unlike Husserl who vacillated when faced with the circulus vituosis argument against psychologism, Peirce presents the psychologistic stance and argues that it invariably leads to such a circle:

> Another mark of our philosophy is the disposition to make psychology the key to philosophy – categories, aesthetics, ethics, logic, and metaphysics. Something of this has existed since Descartes; but since about 1863 every student of philosophy, even though he be one of those who consider the present psychological tendency excessive, has placed a new and higher estimate than before upon the scientific value of psychology. Here was seen one science, than which no branch of philosophy, in the days when men disputed about the *primum cognitum*, was more enveloped in metaphysical fog, which yet almost suddenly, that mist lifting, had come out bright and clear as a June forenoon. How could it but happen, as it certainly did, that men should think that the best way to resolve any problem of philosophy would be to reduce it to a question of psychology? The future must determine precisely what the value of this method may be. It has its opponents. For some years after the movement once became general, no strong voice was raised against it; and ten or fifteen years ago psychologists of the first rank could dream of establishing the truths of their science without any metaphysical assumptions whatsoever. Some writers use such language even yet; but careful examination has convinced the better part that even physics has its metaphysical postulates, and that psychology is peculiarly dependent upon them. That being the case, some writers urge that if psychology needs to rest upon metaphysics, and metaphysics

upon logic, especially if, as some contend, logic rests upon ethics, then to found ethics, logic, and metaphysics in their turn upon a basis of psychology, this self-supporting cycle would rest on nothing. The reply is that the philosophical sciences will support each other, like two drunken sailors. Suffice it to say that the mutual support theory and with it the theory that psychology is the proper foundation for philosophy are not now without vigorous opponents. (*CP* 8.167, Draft of a review of Baldwin's Dictionary, 1901)

Who is Peirce thinking of here when talking about present vigorous opponents to psychologism? Couldn't it be himself who is "now" a vigorous opponent because he has been one for some thirty-five years at this point? Couldn't it be Frege, whom he did not know about? Couldn't it be Bolzano who was long since gone? Maybe after all Peirce did recognize the anti-psychologism of Husserl's Prolegomena? In his mature period, Peirce argued – just like Husserl – in the crucial two steps that 1) logic is primary to psychology, while, in turn, 2) phenomenology is primary to logic (commenting upon a paper James has sent him):

Perhaps the most important aspect of the series of papers of which the one you send me is the first, will prove to be that it shows so clearly that phenomenology is one science and psychology a very different one. I know that you are not inclined to see much value in distinguishing between one science and another. But my opinion is that it is absolutely necessary to any progress. The standards of certainty must be different in different sciences, the principles to which one science appeals altogether different from those of the other. From the point of view of logic and methodical development the distinctions are of the greatest concern. Phenomenology has no right to appeal to logic, except to deductive logic. On the contrary, logic must be founded on phenomenology. Psychology, you may say, observes the same facts as phenomenology does. No. It does not *observe* the same facts. It looks upon the same world; – the same world that the astronomer looks at. But what it *observes* in that world is different. Psychology of all sciences stands most in need of the discoveries of the logician, which he makes by the aid of the phenomenologist. (*CP* 8.297, Letter to James, 3 October 1904)

While the anti-relativist argument and the threat from skepticism is central to Husserl's anti-psychologism, Peirce rarely explicitly addresses psychologism as a species of relativism, probably because relativism was less present as a danger in 1900 New England as it was in Germany, ever ready to embrace reductive origin explanations. Yet, Peirce addresses two of the issues implied in relativism: the non-relative validity of logical truth as well as the non-anthropocentric view of logic. The former is addressed many times, for instance in this earlier quote:

It was shown in the first of these papers that the validity of an inference does not depend on any tendency of the mind to accept it, however strong such tendency may be; but consists in the real fact that, when premises like those of the argument in question are true, conclusions related to them like that of this argument are also true. (*CP* 2.649, "The Doctrine of Chances," 1878)

The latter is addressed on many occasions when Peirce underlines that his concept of mind is not delimited to the human mind (or any other specific domain of minds, for that matter), thus arguing against what Husserl would call anthropologism:

> A subtle and almost ineradicable narrowness in the conception of Normative Science runs through almost all modern philosophy in making it relate exclusively to the human mind. The beautiful is conceived to be relative to human taste, right and wrong concern human conduct alone, logic deals with human reasoning. Now in the truest sense these sciences certainly are indeed sciences of mind. Only, modern philosophy has never been able quite to shake off the Cartesian idea of the mind, as something that "resides" – such is the term – in the pineal gland. Everybody laughs at this nowadays, and yet everybody continues to think of mind in this same general way, as something within this person or that, belonging to him and correlative to the real. world (*CP* 5.128, "Lectures on Pragmatism," 1903)

In one of his late masterworks, ("Prolegomena for an Apology to Pragmaticism," 1906), Peirce broadens his notion of mind not only to encompass possible non-human occurrences of subjectivity (like Husserl), but a generalized conception of mind being at work in a germ-like form already in inanimate nature, only to develop during the process of evolution. The mere connection of signs is thus taken to constitute "quasi-minds." We saw how Husserl, in his theory of science, was also preoccupied with the logical connection structure of propositions, but in his case, a more fixed notion of subjectivity was taken to form the prerequisite of the epistemological access to such sign connection structures. In Peirce, a related idea is turned the other way around, as it were: the very logical connection between signs constitutes, in itself, a quasi-mind:

> Thought is not necessarily connected with a brain. It appears in the work of bees, of crystals, and throughout the purely physical world; and one can no more deny that it is really there, than that the colors, the shapes, etc., of objects are really there. Consistently adhere to that unwarrantable denial, and you will be driven to some form of idealistic nominalism akin to Fichte's. Not only is thought in the organic world, but it develops there. But as there cannot be a General without Instances embodying it, so there cannot be thought without Signs. We must here give "Sign" a very wide sense, no doubt, but not too wide a sense to come within our definition. Admitting that connected Signs must have a Quasi-mind, it may further be declared that there can be no isolated sign. Moreover, signs require at least two Quasi-minds; a *Quasi-utterer* and a *Quasi-interpreter*; and although these two are at one (*i.e.*, are one mind) in the sign itself, they must nevertheless be distinct. In the Sign they are, so to say, *welded*. Accordingly, it is not merely a fact of human Psychology, but a necessity of Logic, that every logical evolution of thought should be dialogic. (*CP* 4.551, "Prolegomena for an Apology to Pragmaticism," 1906)

As it appears, Peirce took the elaboration of such sign connections to require at least two minds (maybe only in the shape of two phases of one and the same mind), and saw this as a truth of logic in his broad sense, presumably as part of

the logic of discovery; Husserl only later addressed related issues in his notion of intersubjectivity.

3.3 Comparison: Husserl's and Peirce's anti-psychologism

Thus, many themes overlap in the anti-psychologism of the two. The *Genesis-Geltung* argument that validity cannot be derived from facts. The anti-anthropologism argument that psychology only studies the human mind, while logic and semiotics are valid for minds as such (no matter which empirical array of beings may prove to be subsumed under this concept). The circulus vituosis argument is refused in its simple form by Husserl, but restated in a more sophisticated form and also marshaled by Peirce. The normative-descriptive argument is refused by Husserl, but supported by Peirce; yet, the latter's distinction between *logica utens* (normative, implicit) and logica docens (*descriptive, explicit*) serves, to some extent, the same purpose as Husserl's distinction between logic as normative art of reasoning (*Kunstlehre*) and logic as a descriptive discipline. Important differences between the two include their opposite stance to diagrams, taken by Peirce to form the royal road to mathematics and to logical form and general regularities overall, taken by Husserl to form part of psychologistic accounts of reasoning. Another important difference regards the relation between signs and conscious subjectivity, the former depending upon the latter in Husserl, the latter on the former in Peirce.

Taken together, the two of them strongly argue for a conception of logic, semiotics, and mathematics that is independent of the individual mind able to intend those entities as well as independent of particular kinds of mind with this ability. But how much more comes along with it? In Husserl, all ideality, that is, all issues of generality – comprising issues studied in the rest of the *Logische Untersuchungen*, indeed in the rest of his work – are taken to form objective structures not dependent upon empirical psychology. In Peirce, his logical idealism also covers much more than mathematics and logic narrowly conceived, thus semiotics as the study of the broad sign machinery necessary to construct propositions, on the one hand, and the whole logic of discovery and heuristics ("methodeutic"), on the other, are taken for form part of structures not dependent upon the particularities of human psychology.[20] Even if logic, to both of them, forms the core of ideality, which most evidently is irreducible to psychology, the zoo of general entities covered by such irreducibility is much vaster. Semiotics, in

---

20 In both of them, the issue of empirical universals of the special sciences is also included in the array of general entities; in Husserl under the headline of "material" or "regional" ontologies; in Peirce under the headline of the special metaphysics of each of the single sciences.

particular, concerns signs that, as identically repeatable, possess the same
ideality – or generality – as the logical propositions constructible from signs.

4 Barsalou's abstraction theory: An example of contemporary psychologism

Many examples of psychologism may be found in contemporary studies of cognition. Here I pick Lawrence Barsalou's much-discussed theory of "perceptual symbols" and the ensuing theory of abstraction. Barsalou's basic idea is that word meaning appears due to "perceptual symbols" based in perception and memory. Perception is taken to leave traces, called simulators, in long-term memory, and the reactivation of those simulators gives rise to a renewed appearance of some of the traces of an object. The object has left a multimodality of traces, and which of them are later simulated depends on the actual task, which is why there is no general conception of, say, dogs, but only different profiles, sounds, smells, etc., which may be simulated for different purposes. This idea of the multimodality of (some empirical) universals is a good idea (not unlike Umberto Eco's [1999] proposal of basic "cognitive types" in *Kant and the Platypus*), just like the idea of selective realization of aspects of the concept in concrete cases. Another related good idea is to go against the tendency to claim general concepts have nothing to do with images; here, they are taken to involve schematic representations as part of the simulators. Abstraction, now, is taken to form "summary representations" (Barsalou 2003: 1178) described as follows: "... behavioral abstractions reflect underlying summary representations of category members in long-term memory. According to these views, when people generalize behaviorally, they describe an underlying summary representation, such as a declarative rule, a statistical prototype or a connectionist attractor" (Barsalou 2003: 1177). "Summary representations" thus have three characteristics: they 1) facilitate "type-token interpretation" (the ability to categorize a particular object as, e.g., a lamp), they 2) give rise to "structured representations" ("this computer is on top of this table"), and they 3) enable "dynamic realizations" changing from one use of an abstract category to the next. This latter property is taken to explain what is seen as a major deficit in abstract empirical concepts: that no exhaustive definition of them may be given.[21] In turn, such summary representations are taken to be sufficient to

---

21 In some sense, this complaint is strange. Why should we expect exhaustive definitions or descriptions of abstract empirical concepts? The fact we do not find such descriptions might rather be taken as a token of their reality; particulars famously do not admit exhaustive descriptions either.

1 explain all other types or aspects of abstraction, such as categorical knowledge,
2 behavioral abilities to generalize across category members, schematic represen-
3 tations, flexible representation, and abstract concepts. Such "summary represen-
4 tations" are taken to arise out of the modality-specific "simulators" of Perceptual
5 Symbol theory described as follows:

> A simulator is *not* a static representation of a category. Instead, it is a generator of represen-
> tations. Specifically a simulator re-enacts small subsets of its content as specific *simulations*
> on particular occasions to represent the respective category. The simulator's entire content
> is never activated all at once – only a small subset becomes active that is tailored to the
> constraints of the current situation . . . (Barsalou 2003: 1180)

The first sentence reminds one of Kant's notion of Schema, which is also not a
picture of the concept, but rather that what makes the production of pictures pos-
sible. Adding to that, the simulator is claimed to form a sort of ungraspable depth
of possibility of which only parts are activated in any single use.[22]

In many ways, this theory adds interesting ideas to the discussion of concepts
of empirical universals (which form a subset only of the issue of abstract con-
cepts, to be sure): the insistence that such concepts involve schematic representa-
tions of features of the object, and that such representations also contain aspects
specific to the various perception modalities. The problem, however, is the focus
upon perception as detached from action, from language, from reasoning as well
as the consequent understatement of the relation between the particular and the
general aspects of cognition. The most remarkable thing is that the simulator con-
cept completely glosses over how the selection of abstract multimodal features in
the simulator is processed from the allegedly non-abstract perception preceding
it: the crucial process of generalization. The only explanation offered is a sort of
induction: "If attention focuses repeatedly on a particular component of experi-
ence across occasions, a simulator comes to represent it. As a result, simulators
develop for various types of object, location, event, action, mental state and so
forth" (Barsalou 2003: 1180). In these two sentences, the whole of the problem is
contained, rather than resolved. Central ontological categories are presumed to
come for free in this process: "In the theory developed here, property simulators
and relation simulators are central to the abstraction process. Each is addressed
in turn. A property simulator arises from repeatedly processing a property of
a category's members" (Barsalou 2003: 1180). Properties and relations, just
like objects, locations, events, actions referred to above, are, of course, classical

───────

22 It seems strange how such a fuzzy notion escaping exhaustive description should be able to
serve as a response to Barsalou's complaint that abstract concepts have no exhaustive definition.

ontological categories. How could they, all of a sudden, "arise" from the simple photocopying device of particular perceptions in simulators? It is not evident how the mere copy-and-replay device of perception-close simulators in long-term memory is suddenly able to not only to generalize and categorize features and collect them into multimodal abstractions, but also to sort them into ontologically relevant categories like properties and relations before allegedly combining these into higher-order concepts.

Here, the distinction between the particular experience of a single dog and the general concept of dog – token and type – is glossed over by means of the "trace" and "simulator" terms. It is simply not made explicit whether the simulator left in memory forms a token or a type; seemingly, the type is taken to be made out of a sum of individual, remembered sense impression tokens. This seems insufficient: it does not account for the cohesion between those impressions in categories; it does not account for the applicability of the type to future cases not identical to any one of those impressions; it does not account for mutual understanding of the same type between persons holding very different such sets of impressions.

The fact that no simple criterion exists for what the exhaustive description of an abstract empirical concept amounts to is taken by Barsalou as the decisive argument that such concepts are problematic (as if such criteria existed for the exhaustive description of anything empirical, including particular objects), but the "simulator" concept is little more exhaustive. The fact that a dog may be abstractly referred to by different terms like "dog," "pet," "predator," "animal" and via different selections of its characteristic looks, sounds, and smells is taken to call for a "dynamic" theory of abstraction where the context is deemed responsible for such different reactivations of the same pool of traces. Instead of the comparatively "simple" theory that perception is always already attuned to general features of reality (an ability that may then be reused in intending abstract objects of logic and mathematics), a cumbersome theory – without empirical support – about neural clusters acting as simulators is constructed. The upshot of the theory is highly deflationist, tending to renounce the existence of anything corresponding to general concepts (even if depending itself upon a large array of such concepts, even including some home-made ones such as "perceptual symbol" or "simulator") in favor of the merely "summary representations." As often in psychologism, ontological complexity is triumphantly renounced, only to be smuggled in again via the back door. How is it possible that different memory traces from different single experiences end up in the right ("dog") category instead of being mixed with other contextual features from the same experience or from other among the bewildering array of fleeting perception experiences? How are "essential" features pertaining to the type sifted from "accidental" features, to

use the old Aristotelian terminology? This constitutes the very problem of cate-
gorization; but this is presupposed without further notice that the "summary"
representations automatically perform this "summing" without any indication of
how it takes place. It is as if the category (say "dog") is already there in the mind
to take care of collecting its traces. A similar problem: where do the prominent
terms "property," "relation," "object," etc., used for the further selection of traces
for the elaboration of abstractions suddenly come from, if not from spontaneous
ontology? Why should the brain be geared to isolate exactly these types of "simu-
lators" especially if they did not enjoy ontological prominence? But most of all,
its deficiency is apparent in the lack of any account of how the brain/mind is
supposed to pass from allegedly completely particular perceptions of particular
objects and to memory traces that seem to be already general. If perception is
particular only, why is memory already general? The whole problem of abstrac-
tion lies already here, long before the selection of traces for different purposes
rendering the theory "dynamic." "Traces" seem to be particular and general at
one and the same time, thus glossing over the whole of the issue of generaliza-
tion, rather important for an abstraction theory. How is memory able to thus gen-
eralize traces from perceptions if they did not contain any such generality?

It seems like the idea is that parts of the simulator are selected by means of an
attention-like process (and attention is of course a standard part of many abstrac-
tion theories), but attention is not sufficient for an abstraction theory because all
it can to is to select among perceptual material, not to generalize and abstract on
the basis of those selections.

A recurrent and basic flaw in this brand of psychologism is the over-emphasis
of the concreteness and particularity of perception, which gives the ensuing prob-
lems of ever ascending to abstractions, once you are caught into the quagmire of
particularity.[23] This is not the place to go deeply into alternative abstraction theo-
ries[24], but one basic idea could be that perception is generally geared to extract

---

23 Alva Noë (2004) argues that the perceived "richness" of human visual perception is never
actual – we do not in fact see all those details we imagine – but is rather a potential fact: we know
we may always move closer in order to focus on selected details. Thus, even human vision is
much more schematic and abstract than is often assumed.
24 A referee of this paper argued that my criticism of psychologism obliges me to present an al-
ternative abstraction theory. I happen to think this is no small feat that would require volumes
rather than a paper, but I can give some hints to where I would look. One thing is that the "rich-
ness" of perception is a peculiarity of higher animals. In most of biology, sensing and perception
are very sparse and abstract, typically selecting few general pieces of environmental information
relevant for survival. So perception has its biological origin in abstraction and still bears much
more traces from it than the misleading idea of the full particularity of rich perception admits.
Thus, there is generality already in perception, and, to take visual perception, edge detection

and object construction take place already in the retina and early visual cortex long before conscious perception. So perception is already much more general than assumed in many empiricist theories and it is geared to detect gestalts, general patterns, and similarities, already in the present now of perceptual experience and in working memory, long before any simulators in long-term memory. On top of that comes the innate character of some very basic aspects of categorization, like object constancy, cross-modal pattern perception, recognition of conspecifics, of faces, of biological movement versus physical movement, subitizing the size of small sets, etc. Innate content of this sort, however, only provides some basic structures of abstraction. Much more important is the generality of action, as emphasized by the pragmatist tradition for connecting meaning with possible action. Basic biological actions have goals that are general (food, drink, sleep, sex, escape, fight, hunt, etc.); general in the sense that many different concrete action chains and many different supporting objects of the environment may afford the realization of one action goal. So actions are already generalizing in their interface with the surroundings, governing the direction of perception in the quick action-perception cycles of higher animals, including humans. Perception-action cycles are a basic feature of life, phylogenetically as well as ontogenetically, and preclude the idea that we should somehow begin abstraction with particular perceptions and some simulators only. Rather, perception and action are wired together in a way that makes the general purposes of action select in the general patterns constructed by perception. As to logic – so central to the strife over psychologism – it seems to be realized in germ-like form early in biology within the perception-action cyclus in the shape of inferences linking perception and action, governing what to do after a given partial perception, and where to direct you sensory organs after a given partial action. So inference is just as basic as perception and action and is no late, higher-level result of abstraction processes (even if explicit, consciously controlled inference, to be sure, is a late growth). Perception typically detects general action affordances. There is no such thing (or, at least, only as a late and marginal spinoff) as a pure perception completely decoupled from action. So the problem is simply not the psychological issue of how to abstract from a pure perception. In such perception-action cycles, relevant aspects of world structure impose themselves on the organism; the a priori structures of simple logic and mathematics, the material ontologies of biology, communication, and sociology, and the enormous amount of empirical universals from mice to telephones.

Regarding abstract concepts supported by language, they acquire stability from further sources. One is common action and the experience of successful communication and reference, forcing language users to distinguish between sharable concepts in themselves on the one hand and the particular psychological imagery each user and his simulators may adorn concepts with. The "numerical identity" of concepts across language users is achieved, moreover, by the normative character of linguistic concepts indicated by the common agreed-upon labeling by means of the word expression, forcing every language user to distinguish between ideal, common meaning and his own particular imagery, the reality of the ideal meaning being granted by the fact that other language users address the same type of objects, forming a collective knowledge transgressing the individual sum of experiences (and forming forerunners of scientific concepts). Every language user knows this distinction, knows other language users know it, knows other language users know other language users . . . forming an obligation of each user to attune himself to the common general concept. This concept is what adds to the truth-value of a proposition expressed by a sentence using it. If language users may agree not only approximately but completely that "Kennedy was shot dead in 1963," it is because they agree upon the general, and in the Husserlian sense ideal semantics of "shooting," despite the fact that each user may have

general features of the environment and thus recognize colors, shapes, individu-
als (as James Hurford insists, as simple objects as individuals are also generaliza-
tions from instantaneous impressions). This becomes even more evident if a com-
parison is made to simple animals without central nervous systems: their
cognitive abilities are generally restricted to the detection of the presence of few,
very general qualities of the environment, qualities closely connected to impor-
tant kinds of nourishment and danger relevant for the survival of the species. In
that sense, feature abstraction is biologically much simpler than full, detailed
perception, which should rather be seen as a highly developed ability of complex
organisms with CNS and moveable perception organs facilitating quick percep-
tion-action cycles and the construction of environmental maps. So the issue is not
so much that of finding out how to come from perception to abstraction. It is,
rather, how to come from abstraction to perception during evolution.

   A related issue is that perceptual symbols are conceived of in isolation from
their appearances in propositions; their natural habitat, so to speak. Used in con-
nection with action, it is biologically crucial that perceptual symbols may be used
to assess correct states-of-affairs upon which to act. Perceptual symbols with lin-
guistic representation thus have their normal function appearing in sentences
expressing propositions.[25] This is also where children normally encounter words
for empirical universals during language learning. Thus, the identity of concepts
across language users – difficult to understand for a Barsalovian approach where
each language user has his own idiosyncratic concept closely tied to his own ex-
periences with, say, dogs – is tied to the fact that language users are able to agree
upon the truth value of propositions, say "That dog is gray." The reason why
language users may agree not only approximately but completely upon such a
sentence is the *schematic* character of the involved perceptual symbols of "dog"

───────────

highly different psychological imagery, memories and simulators of their own experiences with
shooting, not to talk about that particular day in 1963. Thus, language forms a collective, objec-
tifying and stabilizing support of general concepts already there in pre-linguistic biology. A spe-
cifically important part of this is the ability of language to support "hypostatic abstractions,"
a special class of abstractions creating higher-level objects of thought (such as "redness," "grav-
ity," "trajectory," "oxygen," "phlogiston," etc.) some of which may refer to general regularities of
reality.
   I cover some of these ideas in Stjernfelt (2007: ch. 8–9, 11; 2010, forthcoming a, forth-
coming b).
25 They may also occur in propositions outside of language, of course, in perceptual judgments
as when some object is judged to be of a specific type without expressing it in language. In pre-
human higher animals, such proto-propositions occur in cognition (as argued by Hurford [2007]
and Stjernfelt [forthcoming a, forthcoming b]) and will also be the natural locus of occurrence of
perceptual symbols.

and "gray."[26] It is precisely because such concepts are underdetermined, sche- matic, unsatiated, general, multiply realizable – or involve "ideal objects" to use Husserl's terminology – that they may appear identically in the minds of different language users; notwithstanding their very different experiences with dogs, etc., and their different mental imagery when using the concepts.

A further problem – also noted by many of the commentaries to Barsalou's original 1999 target paper – is that if perceptual symbol theory does in fact ex- plain anything at all, it would only be abstractions directly from perceptions, forming a rather small subset of abstractions. Murat Aydede thus asks whether all concepts are really perceptual symbols: "Without an independent and noncircu- lar account of what this sense is, of what it is that makes symbols exclusively perceptual, I am not sure how to understand this claim, let alone evaluate its truth" (Aydede in Barsalou 1999: 611). Barsalou's account thus leaves most ordi- nary concepts outside of the reach of explanation, as Brewer remarks:

> Barsalou argues that all cognitive representation is carried out with perceptual symbols. A list of things the theory has no convincing way to represent: (1) abstract constructs such as entropy, democracy, and abstract; (2) (non model) scientific theories such as evolution and quantum mechanics; (3) gist recall in abstract sentences . . . ; (4) logical words such as "but," "therefore," and "because"; (5) language form; (6) the underlying argument struc- ture of his own article. (Brewer in Barsalou 1999: 612)[27]

---

26 The referee of this paper thus claims that word meanings must be individual in each lan- guage user, although often rather similar to one another. Against this, the ability of language users to agree completely upon propositions involving general concepts must be argued. The semantics of words can be measured on their contribution to the truth-value of propositions in which they appear; this truth-value being independent of the individual imagery of language users. Thus, successful co-reference, agreement upon states-of-affairs and common action across language users is the relevant criteria for concept identity, not individual associations.

27 Barbara Landau, in her comment, accuses Barsalou of "Reinventing the Broken Wheel" and just renaming traditional accounts:

> [Simulation] is essentially equivalent to the notion of a concept, frame, or theory. As such, it has all of the same virtues (being able to explain the dynamic, structured, and interpretive nature of concepts), and inherits all of the same flaws. Consider Barsalou's claim to have made progress in understanding how we represent Truth (Barsalou 1999: sect. 3.4.3): a sim- ulated event sequence frames the concept. But what is the concept? Simulations devoid of content do no better at characterizing our knowledge than concepts devoid of content. Without understanding the underlying notions of even such modest concepts as Bird, Hat, or Above, we are in no better position to understand how it is that we manage to gain, generalize, or ground our knowledge. (Landau in Barsalou 1999: 624; the first word of the quote is rendered as "Stimulation" in the text; the context seems to indicate it should be "Simulation")

To this list, mathematics and logic, the classical examples of anti-psychologism, may easily be added.[28]

Barsalou's type of psychologism is one of simply not mentioning many of the important problems left unaddressed claiming that "summary representations" solve them all. One is the identity of concepts across persons: how is that possible when each of us has an infinity (as Barsalou claims) of simulators in our brain, individually built from finite experience? Thomas K. Landauer in his comment addresses this issue: "A critical aspect of human concepts is their mutual comprehensibility; the sharable properties are what we want to understand first and foremost" (Landauer in Barsalou 1999: 624–625) Similarly, the conspicuous absence of inference and reasoning from Barsalou's account also seems to indicate he assumes they may be explained away by perceptual symbols along with all other issues of abstraction, as Landauer continues:

> The most primitive sensitivity to touch is useless without inference. There is nothing more physiologically or logically real about perception than about abstract cognition. Both are neural processes designed to promote adaptive function, only some of which needs to depend on perceptual input or feedback. It makes as much sense to speak of perception as grounded in inference as the other way around. (Landauer in Barsalou 1999: 624–625)

Thus, in Barsalou's theory, generalization, abstraction, the numerical identity of concepts across subjects, concepts not directly related to perception, inference, logic, mathematic; all of these central issues are more or less explicitly taken to be eliminated to the simple perception-and-memory processes of simulators. It is not necessary to be as harsh as Stellan Ohlsson to judge this piece of psychologism unsatisfactory:

> There is not now, and there never was, any positive reason to be interested in empiricist theories of cognition. Empiricists are forever arguing, as does Barsalou, to survive the obvious objections. Better be done with such theories once and for all and focus on the fundamental and remarkable fact that humans are capable of forming abstractions. The most natural explanation for this fact is that abstract concepts are exactly what they appear to be: internally generated patterns that are applied to perceptual experience to interpret the latter. (Ohlsson in Barsalou 1999: 631)

In the final conclusion of the abstraction paper, Barsalou writes: "By applying loose collections of property and relation simulators to perceived and simulated

---

28 To this list, the linguist James Hurford (2007: 621) adds an example that is important in this context: even stable individuals are, in themselves, abstractions from fleeting experience so they cannot be taken as point of departure for a symbol or abstraction theory. This example would have amused Peirce who also insisted on absolute individuals as being an abstract idea.

category members, interpretation, structure and flexibility arise naturally in the
abstraction process" (Barsalou 2003: 1185). Flexibility indeed sounds much bet-
ter than rigidity, but the theory's emphasis on dynamicity and different instantia-
tions of simulators seemingly has no answer to the basic problems of every ab-
straction theory, namely, how subjects may agree upon discussing the very same
concepts (and not only concepts that just flexibly seem similar), how "property"
and "relation" and other ontological categories emerge as organizing concepts
out of perception, how general categories are established out of category mem-
bers, how perception is related to reasoning and action; not, again, to speak
about the vast issues of logic, semiotics, and mathematics. So, flexibility is bought
at an enormous price. Even if adding some good ideas to the structure of one par-
ticular kind of abstract concepts – those referring to empirical universals – the
theory's psychologism makes it assume this same process accounts for all other
abstract contents of the mind, if not the world.

It is remarkable how this allegedly empiricist theory of symbols is no less
theoretical than the anti-psychologism theories it seeks to explain away. Without
explicitly stating it, like many psychologism-influenced theories, it seems to be
founded on a metaphysical theory claiming that the world consists of particulars,
and the grouping together of them into generals is something created by the
mind.[29] On the basis of this more or less implicit nominalist metaphysics –
common to many psychologisms – are built the hypotheses of the particularity of
perception and its primacy as compared to abstraction and inference structures.
A metaphysics according to which general structures are just as ordinary inhabit-

---

29 This immediately hands over the issue of explaining the ubiquity of general concepts in ev-
eryday thought and language as well as in science to psychology itself, which is thus forced to
come up with some theory of abstraction, now taken to be a purely psychological process, creat-
ing abstractions rather than grasping them. This consequence is apparent, of course, in the
British empiricists, and reappears in a latter-day version in Barsalou's abstraction account. It
should be noted, that this psychologism leads nominalists to a strange composite (even if rarely
admitted) ontology. On the one hand, nature is taken to consist of particulars only. General con-
cepts are taken to be the results of general labels generated by the mind. But as the mind must
also – pace naturalism – form part of nature, generality, absent from material nature, is taken to
appear only there, in the mind. So nominalist ontology ends with no less than three different
regions of being: 1) matter, consisting of particulars; 2) mind, naturalistically consisting of par-
ticulars but with the peculiar ability of being able to give rise to 3) the third constituent of the
world: general labels. As compared with this ontology, an ontology like Peirce's or Husserl's find-
ing aspects of generality in the world as well as the mind, may seem not only more parsimonious,
but also considerably less strange. Moreover, the ubiquity of general concepts in the sciences
("gravity," "electron," "metabolism," "inflation," etc.) receive a more natural interpretation
when taken to refer to ideal objects – general features – of the world, than when taken to refer to
psychological labeling only.

ants of the furniture of the world as are individual objects seems much more able to explain not only empirical abstractions but also the mind's grasp of non-empirical abstractions in semiotics, logic, and mathematics. Such a metaphysics, it is true, may seem less parsimonious. But, with Einstein's famous quip, we should make our theory as simple as possible, but no simpler.

5 Conclusion: The indispensability of the generality of signs

Both Peirce's and Husserl's anti-psychological semiotics is based on the observation that even if simple, singular signs exist, most interesting signs, beyond a certain degree of complexity, are types, and many of these, in turn, refer to general objects (Peirce) or ideal objects (Husserl).

A very important rule here is that the semiotic access to generality is made possible by general signs being unsatiated and schematic: the predicate function "_ is blue," for instance, is general 1) because referring possibly to all things blue, 2) because of the generality of the predicate blue, having a schematic granularity allowing for a continuum of different particular blue shades.[30]

This generality is what makes it possible for the sign to be used with identical – general – meaning, at the same time as the individual users are free to adorn their use with a richness of individual mental imagery and associations (like Ingardenian filling-in during literary reading) without this imagery in any way *constituting* meaning; sameness of meaning in language being granted by successful intersubjective communication and referral.

The identical repetition of signs and their meanings is possible only in virtue of their being general (or Husserl: ideal) objects. Individual, particular objects or events may, of course, never be repeated completely identically, any particular object necessarily differing from any other in space and time and its indefinite amount of properties. But schematic representations employed by signs importantly differ by highlighting only a restricted and controllable amount of properties. As to the sign vehicles, this explains why different tokens may incarnate exactly the same type; that the spoken "A" in English may come in an indefinite

---

30 The culturalist argument that "blue" and similar words covers different parts of the color spectrum in different languages and thus precludes mutual understanding, does not hold. Exactly the fact that it can be proven that different color name systems exist, shows that there is a common underlying structure to which the color terms of all languages refer, and any one of the different cultural's "blue" may be taken as reference term, defining the limits of the category in terms of spectrum wavelengths.

amount of different acoustic pronunciations, pitches, and volumes and still re- 1
main the same A, or that the word "the" is exactly the same no matter the typog- 2
raphy, accessible for speakers by means of "categorical perception." And as to the 3
sign meaning and reference, it is the sparseness of this generality/ideality which 4
makes it is possible for people to agree 100% – and not approximately only – on 5
the meaning of propositions like "$2 + 2 = 4$" or "Kennedy was shot in Texas in 6
1963" or "A man took his red hat and walked along the street" or "A soldier came 7
marching along the high road: 'Left, right – left, right' " (to take a fiction example) 8
or "A UFO landed at Roswell in 1953" (to take a fallacious example), even if the 9
different users of those sentences may add extremely varying mental imagery of 10
those propositions in their own psychological acts of intending them. In most 11
cases, the individual sign users without further ado realize that other sign users 12
have their own imagery without getting the idea of confusing meaning with dif- 13
ferent uses and images associated with it. 14

This is also why any attempt to *define* the sign in terms of sets of mental rep- 15
resentations or averages over mental representations is doomed to fail. Not only 16
are the mental representations of other persons (or animals) notoriously inacces- 17
sible, and not only do they come in an indefinite number making the ensuing 18
description of sign meaning fluctuating and impossible; but even if they were, in 19
fact, accessible and we were able to collect them all, such sums or averages would 20
include misunderstandings and idiosyncratic mental imagery foreign to the gen- 21
eral meaning of propositions. 22

As to the important experimental research of semiotics, by means of ques- 23
tionnaires, tests, eye-tracking, brain-imaging and so on, all such procedures im- 24
portantly add to our general understanding of how signs, meanings, and refer- 25
ences are processed by human beings and their brains and minds, in some cases 26
by different groups of human beings. But such results can never hope to reduce 27
the generality of signs to any mere sum of such individual processing. This lies 28
already in the fact that the very experiments themselves and their interpretation 29
crucially rely upon semiotic idealizations. This lies in the very logic of experi- 30
menting. Experiments as such address general relations expressed in hypotheses. 31
As to psychological experiments specifically, the instructions given to a range of 32
different subjects in the scanner, for instance, is presumed to remain the same, 33
ideal instruction, understood as pertaining to the same task by all participating 34
subjects. Statistical averaging across participants is supposed to weed out indi- 35
vidual deviations, but this takes place on the basic assumption that such devia- 36
tions are still atypical and irrelevant and that the general pattern of the task 37
remains behind them, granted by the statistical significance of the data. In the 38
scanner example, e.g., the results obtained are processed by means of sophisti- 39
cated mathematical statistics the ideal regularities of which are applied indis- 40

criminately across different uses, and in this case, over different subjects. We
expect these mathematical signs to stay identical and valid over time, over large
amount of data, and over different scientists using them, so the very idea and
procedure of statistical data processing presupposes the ideality/generality of
mathematical signs and structures. Ideality does not stop here, however. The cru-
cial comparison of brain activity signals across subjects is calibrated using an
idealized representation of the human brain. One such representation is the so-
called Talairach Atlas of the human brain, warping individual brain shapes and
sizes to fit the Talairach coordinates in order to make them comparable. The
Talairach Atlas, thus, forms an idealization of the human brain (constructed
from postmortem sections of a 60-year-old French woman whose brain size was
smaller than average, which means that most individual brains must be consider-
ably transformed to fit the rather small size of the ideal atlas). Other competing
atlases have been developed, such as the MNI (Montreal Neurological Institute)
brain, but the ideality of the general brain structure it represents of course
remains the same. The generality, ideality, and stability of this sign system is in-
dispensable for the very comparison of single brain scans, and, moreover, it pre-
supposes that there exists, in reality, an isomorphism mapping between the
functional parts and connections from one human brain to another; a hypothesis
about the empirical reality of universal human brain structure.[31] Lastly, the findings
– typically plotted as colored spots indicating activity sites in the idealized brain
– are given a universal interpretation as to which brain functions generally
participate in the task investigated, summed up in the general conclusion to the
experiment. The generality of the result, the significance of the result for human
beings in general, apart from the particular sample of test persons, is granted by
mathematical statistics. So the ideality, generality, and identity of signs are pre-
supposed in all phases of empirical brain scanning experiments and that is why
such experiments could never hope to disprove the existence of such general
signs. Brain imaging, of course, is only picked here as a conspicuous example;
the whole idea of (not only psychological) experimenting presupposes both the

31 Such idealizations, of course, may fail or prove to be incorrect in details but the important
issue is that they cannot be assumed to be conventional through and through; they must corre-
spond to existing general neural structures *in re*. If fallacies in such scientific idealizations
should prove sufficiently strong, they will have to be given up completely, which would, in this
case, prove fatal for cognitive neuroscience; in the more ordinary case, fallacies remain in the
details, and the erroneous idealizations will give way to better idealizations (such as the recent
tendency to prefer the MNI to the Talairach map). Bottom line is that the project of neuroscience
as such is impossible without reference to such ideal diagrams as the Talairach and MNI map,
which is why cognitive neuroscience fits badly with a psychologistic metaphysics claiming all
generality is a mere product of the mind – see (Roepstorff 2007).

repeatable generality of the setup and the hypothesis of a general finding expressed in general terms.[32]

Semiotics is impossible without anti-psychologism. If signs were only particular, fleeting, and shifting epiphenomena of brains and minds, this would not only give up signs as such as objects of scientific study, but it would, in turn, destroy even psychology itself along with all other sciences, because sciences, as already Aristotle realized, always intend general structures, even when they describe particular objects.

References

Amini, Majid. 2008. Logical machines: Peirce on psychologism. *Disputatio* 2(24). 336–348.

Barsalou, Lawrence. 1999. Perceptual symbol systems. *Behavioral and Brain Sciences* 22. 577–660.

Barsalou, Lawrence. 2003. Abstraction in perceptual symbol systems. *Philosophical Transactions of the Royal Society of London* 358. 1177–1187.

Clark, Andy. 2008. *Supersizing the mind*. Oxford: Oxford University Press.

Colapietro, Vincent. 2003. The space of signs: C. S. Peirce's critique of psychologism. In Dale Jacquette (ed.), *Philosophy, psychology, and psychologism*, 157–180. New York: Kluwer.

Deely, John. 2001. *Four ages of understanding*. Toronto: University of Toronto Press.

Eco, Umberto. 1999. *Kant and the platypus*. London: Secker.

Fisch, Max. 1986. Peirce's progress from nominalism towards realism. In *Peirce, semeiotic, and pragmatism*, 184–200. Bloomington: Indiana University Press.

Frege, Gottlob. 1986. *Grundlagen der Arithmetik*. Ditzingen: Reclam.

Hurford, James. 2007. *The origins of meaning*. Oxford: Oxford University Press.

Husserl, Edmund. 1970a. *Logical investigations*, J. N. Findlay (trans.). London & Henley: Routledge & Kegan Paul.

Husserl, Edmund. 1970b. *Philosophie der Aritmetik* (Husserliana 12). The Hague: Martinus Nijhoff.

Husserl, Edmund. 1975. *Logische Untersuchungen* (Husserliana 18). The Hague: Martinus Nijhoff.

Husserl, Edmund. 1984. *Logische Untersuchungen* II, I.-II. Teil. (Text nach Husserliana 19/1–2). Hamburg: Felix Meiner.

Husserl, Edmund. 1985. *Erfahrung und Urteil*. Hamburg: Felix Meiner.

Jacquette, Dale (ed.). 2003. *Philosophy, psychology, and psychologism*. New York: Kluwer.

Kasser, J. 1999. Peirce's supposed psychologism. http://www.cspeirce.com/menu/library/aboutcsp/kasser/psychol.htm#docinfo (accessed 24 December 2012).

Kusch, Martin. 1995. *Psychologism: A case study in the sociology of philosophical knowledge*. London: Routledge.

---

[32] A strong defense for the commitment of scientific theories as such to general terms and their reference to (empirical) universals can be found in Smith and Ceusters (2010).

Kusch, Martin. 2007. Psychologism. In Edward N. Zalta (ed.), *Stanford encyclopedia of philosophy*. http://plato.stanford.edu/entries/psychologism/ (accessed 24 December 2012).

Noë, Alva. 2004. *Action in perception*. Cambridge: MIT Press.

Peirce, Charles S. 1931–1966. *The collected papers of Charles S. Peirce*, 8 vols., C. Hartshorne, P. Weiss & A. W. Burks (eds.). Cambridge: Harvard University Press. [Reference to Peirce's papers will be designated *CP* followed by volume and paragraph number.]

Peirce, Charles Sanders. 1967. Manuscripts in the Houghton Library of Harvard University, as identified by Richard Robin, *Annotated catalogue of the Papers of Charles S. Peirce*. Amherst: University of Massachusetts Press. [Reference to Peirce's manuscripts will be designated *MS*.]

Peirce, Charles Sanders. 1982–. *Writings of Charles S. Peirce*, 5 vols., M. Fisch, E. Moore & C. Kloesel (eds.). Bloomington: Indiana University Press. [Reference to Peirce's writings will be designated *W* followed by volume and page number.]

Peirce, Charles Sanders. 1998. *Essential Peirce: Selected philosophical writings,* vol. 2 (1893–1913). Peirce Edition Project (eds.). Bloomington: Indiana University Press. [Reference to vol. 2 of Essential Peirce will be designated *EP* 2.]

Roepstorff, Andreas. 2007. Navigating the brainscape: When knowing becomes seeing. In C. Grasseni (ed.), *Skilled vision*, 191–206. Oxford: Berghahn.

Smith, Barry. 1978. Frege and Husserl: The ontology of reference. *Journal of the British Society for Phenomenology 9*. 111–125.

Smith, Barry & Werner Ceusters. 2010. Ontological realism: A methodology for coordinated evolution of scientific ontologies. *Applied Ontology* 5(3–4). 139–188.

Stjernfelt, F. 2007. *Diagrammatology: An investigation on the borderlines of phenomenology, ontology, and semiotics*. Dordrecht: Springer Verlag.

Stjernfelt, F. 2010. Peirce's notion of diagram experiment: Corollarial and theorematical experiments with diagrams. In Richard Heinrich, Elisabeth Nemeth, Wolfram Pichler & David Wagner (eds.). *Image and imaging in science, philosophy, and the arts: Proceedings of the thirty-third international Ludwig Wittgenstein symposium in Kirchberg*, vol. 2, 305–340. Heusenstamm: ontos verlag.

Stjernfelt, F. (forthcoming a). Signs conveying information: On the range of Peirce's notion of propositions. *Dicisigns*.

Stjernfelt, F. (forthcoming b). The evolution of semiotic self-control: Sign evolution as the ongoing subdivision, articulation and making explicit of a basic metabolic argument structure. In T. Schilhab, F. Stjernfelt & T. Deacon (eds.), *New perspectives on the symbolic species*. New Haven: Yale University Press.

Bionote

Frederik Stjernfelt (b. 1957) is a professor at Aarhus University ⟨semfelt@hum.au.dk⟩. His research interests include semiotics, epistemology, political philosophy, and cognitive science. His publications include *The democratic contradictions of multiculturalism* (forthcoming).

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40