

Recent studies on signs: Commentary and perspectives

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Abstract. In this commentary, I reply to the fourteen papers published in the *Sign Systems Studies* special issue on Peirce's Theory of Signs, with a view on connecting some of their central themes and theses and in putting some of the key points in those papers into a wider perspective of Peirce's logic and philosophy.

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My commentary proceeds in the order in which the papers appear in the special issue of *Sign Systems Studies* on Peirce's Theory of Signs.¹

Francesco Bellucci's paper "Exploring Peirce's speculative grammar: The immediate object of a sign" puts forward a closely argued thesis that only propositions have immediate objects. This apt finding is a welcome reminder of some of the crucial elements concerning Peirce's theory of signs, worth recapitulating and putting into a wider perspective. One of them is not to confuse the objectual and the meaning categories of signs. The other is the futility of attempting to interpret theories that Peirce came to develop, drawing on other thinkers whose ultimate presuppositions Peirce would not and could not have shared. Here the *soi-disant* Fregean interpretation of Peirce's theory has sometimes been put forth to the effect that signs have (dynamic)

¹ Most papers of the current special issue have originated with the events organized or co-organized by the guest editor of this volume, in 2014–2015, including the 2nd Applying Peirce Conference in Talsinki on Peirce's centennial in April 2014 and the Workshop on Icon at the University of Helsinki in September 2014 (see also Pietarinen 2014). Several Metaphysical Club meetings were held at Helsinki and Tallinn in 2014–2015, and two panels during the 14th International Congress on Logic, Methodology and Philosophy of Science in Helsinki, August 2015 ("Pragmaticist philosophy of science: Old and new"; "Tracking the recent turn in philosophy of notation").

The transcription of Peirce's unpublished work on divisions of signs that I have included can be read as an answer by the author himself to some further issues raised in the individual papers.

objects in the sense of the *Bedeutung*, indeed typically translated as the reference of the sign. It is the immediate objects, the story goes, that are what Frege has in mind when he uses the term *Sinn*. One need not look further than Peirce's own comments, where statements on signs "referring" to their objects are few and far between. Signs represent, indicate, resemble, are determined by, and so on, but they do not refer. References to 'reference' are much more common in Peirce's corpus as soon as he starts to examine assertions in connection to their universes of discourse, ranges of possibilities, states of affairs, states of information and so on. Can the rebuttal of the Fregean interpretation get any more explicit than that?

Far from implying a Saussurean or Derridean hermetically closed system of signification, the consistent use of 'representation' instead of 'reference' in relation to objectual categories does not offer comfort to Fregean interpretations with respect to the meaning of fiction, either. The reason why Frege gets into such troubles with fictional characters – and why later interpreters have got into even deeper waters in trying to understand objects of fiction within the narrowly conceived Fregean framework of abstract objects (witness e.g. the 'Julius Caesar problem' in the philosophy of mathematics)² – is that Frege thinks that in asserting something one is compelled to quantify across one big domain of logical thought. Peirce, in contrast, takes the view agreed to by contemporary literary scholars, namely that in producing fiction one is at once making a semantic gesture towards a creation of domains of fiction over which the relevant discourse is understood to run.

One need not even enter the realm of fiction to observe similar phenomena, as it is well understood in contemporary theories of discourse, e.g. discourse representation theory, that it is in the nature of discourse, and in the common ground shared by the speakers and interpreters, that new objects, such as discourse referents, come to be created and represented by the discourse, much like that *lekta* of the Stoics might have been.

But what exactly is an immediate object, as an object of a proposition? Propositions have complex structures and potentially many candidates can claim the status of those objects "as the sign represents them". Here I feel we can go even further than Bellucci and argue explicitly that the true logical home of immediate objects is the quantifiers or, more generally speaking, the determiners, demonstratives, modals, and so on. Immediate objects determine signs that are propositions, which themselves denote or have dynamic objects as values of the variables that those immediate objects quantify over.

² The Fregean problem is to have a theory that uniquely identifies natural numbers as objects by their identities not only with all natural-number objects but also with all non-mathematical objects, including Julius Caesar, that would avoid Julius Caesar being among the objects of natural numbers. The problem does not arise in Peirce's philosophy of mathematics (Pietarinen 2010b), since natural number terms do not refer to abstract objects: it is the dynamic object that determines the sign of the natural number, and those signs give rise to their interpretants as non-trivial applications of arithmetic.

The hypothesis that immediate objects are quantifiers and quantified variables conforms well to Peirce's later development of his theory of logic and game-theoretic semantics as an interpretation of his logic. In game-theoretic semantics, the players pick elements from the domain of discourse to serve as the values of the variables. Generally, one can think of such interpretations as substitutional or objectual. In the former case, the players give names to the elements (or dynamic objects, if you will) of the domain and substitute the variables with those names. In the latter, it is the elements of the domain that are the values. I have argued elsewhere that Peirce understood the interpretation of quantifiers objectually, and that this is attested in his pragmatic theory of proper names (Pietarinen 2010a). Now my interpretation gets further support from Peirce's 1904 theory of signs, as it is only the objectual interpretation that in the end not only is consistent with the immediate/dynamic distinction but presupposes it. In substitutional interpretation, the names are the dynamic objects, and since names ordinarily denote some *thing* they are the names of, one is led to an impossible situation, as dynamic objects do not denote any further thing: there are no 'final objects' or *Dinge an sich* in Peirce's account.

Maybe this game-theoretic interpretation of propositions, which Peirce indeed developed in detail and with an uncanny proximity to its contemporary version,³ also serves to alleviate the worries **Helmut Pape** has concerning Bellucci's argument. Pape calls for such a notion of an immediate object that would capture the "cognitive paths and conditions" that enable us to determine the correct interpretation of those propositions. Now the matter of correct interpretations is the matter of the existence of winning strategies for those players who set out to verify or falsify the propositions, in so far as non-vague and non-general propositions are concerned. (One might want to entertain triadic logic and undetermined truth-values for indefinite propositions, which serves the point just as well.) Such existence is an objective feature of the models in question. But to act according to such strategies calls for reasoning which surely is not devoid of cognitive value. Goal-directed strategic interactions concern general tendencies to act in certain ways in certain kinds of circumstances when exposed to qualities, resemblances and recognitions of various kinds. The immediate objects of propositions provide the precepts which guide the players in their task of seeking and finding the suitable dynamic objects from the domains of discourse to serve as values of those immediate objects. The domains need not be limited to elementary and extensional ones as they can be intensional, modal, temporal, higher-order, results of abstractions (possessing 'blueness'), and so on. A useful way of looking at immediate objects as precepts that serve as an aid to interpretation and not merely as inactive formal elements of propositions of speculative grammar is to conceive of them in their diagrammatic forms, especially as the theory of existential graphs

³ See Pietarinen 2006b, 2007. Peirce's rule to interpret "Any man will die" quoted by Pape is virtually identical to that of Jaakko Hintikka's game-theoretic semantics.

represents them. Those diagrammatic forms are instructions that tell the players how they are to go about playing the semantic games. What makes this semantic or semiotic interpretation of propositions and assertions ultimately a matter of speculative rhetoric, and thus satisfy Pape's wish, is articulated by the interactive structure of diagrammatic propositions and ultimately realized by considering the nature of those strategies as habits of action that we find in interactive structures.

It is clear that Pape's own conception of the dynamic object in "Peirce on the dynamic object of a sign: From ontology and semiotics and back" is not quite the one that Bellucci endorses, which roughly is the denotation of immediate objects. In contrast, Pape maintains that the structure of a process ontology and dynamic semiotics is *inferential*, and that the dynamic object emerges as a *functional role* in the model of those inferential processes. According to Pape, all completely realized, or should one say rational, sign processes have a property of transitivity. One cannot deny the fundamental importance of transitivity, as Stjernfelt's note on the *nota notae* (see below) also points out. Yet many processes and inferential and rational pathways appear to fail to meet the requirement. Similarity is not a transitive relation, and neither is preference, parenthood or the relation of relevance. Icon A that resembles Icon B that resembles Icon C need not resemble C. That seems to scrap large parts of sign classes and sign actions right there from the domain of transitive inferences. Perhaps one might want to argue that in these cases one simply is not performing fully rational acts, or that the observations of such counterexamples are highly empirical, but what they really seem to point out is that we might want to have a model of semiosis that helps us understand also non-transitive and not only either ideally rational or exclusively empirical phenomena.

But is not the existence of non-transitive sign processes only a welcome thing in semiosis? There is an element of spooky functionalism if all there is to dynamic objects is that they are emergent features or functional roles in an inferential structure of a signification process. In fact, Pape's argument comes dangerously close not only to functionalism but also computationalism (if those sign processes were given a computational description) and even constructivism, as Pape himself seems to be willing to accept. I think Peirce's scholastic realism quickly discounts any constructivist pitch. The fundamental problem of functionalism is that if all there is to a sign's signification is that it performs or computes suitable functions, and that cognitive or mental states thus emerge from suitable configurations of (computable) functions, then anything in which those functions can be realized can manifest signification. My socks and gloves, right here and right now, on my both feet and hands, would exhibit such semiotic functions and construct dynamic objects as the result of those processes.

I can anticipate a reply: that similarity, preference, relevance or whatever non-transitive relations there may be, are vague relations and not genuinely but only degeneratively triadic or dyadic relations. They would lack the third, the branch

in the relation of *teridentity*, which Peirce once aptly termed “indefinitely multiple identity” (MS 490; Pietarinen 2015b). That branch caters for relations with modes of identification that interpret identities. Likewise, similarity of signs and objects is similarity in certain respect, just as preferential orders and measures of relevant meanings are. They are highly contextual, but stating so is a truism. It does not make the matter of similarity or identity of objects overly epistemological. Game-theoretic semantics also proves the point. Once dynamic objects are picked in the semantic game to serve as values of immediate objects, making the right or good choices has the effect of satisfying the propositions and ascertaining their truth or falsity in a given model. Which values propositions have depends on whether and for whom in the semantic games between the utterer and the interpreter the stable habits of action (winning strategies) obtain. Yet the identity of such habits does not depend on whether the players know what these strategies are (Pietarinen 2007). Strategies either exist in relation to the models or they do not. A game either has certain well-defined solution concepts or it does not. A quantifier that prompts the selection binds the elements in the domain of discourse in a certain manner, but those elements are real elements of the structure of that domain quite independently of what we happen to know about the identity of habits or what we come to assert by propositions that contain such quantifiers and other logical devices.⁴ Take knowing *wh*-statements as an example. I can know who someone is by re-identification, by pointing, or observing a portrait of a person, and I can know him or her by identifying his or her public status or finding out his or her social security number. In either case, that individual is a dynamic object quite independently of the particular modes of identification that I might resort to in my attempt of answering knowing *wh*-questions.

While I agree with Bellucci’s comment that the apparent contradiction between the sign-independence of objects and our understanding of objects depending on inferential structures of semiosis is only apparent, the particular example of Pape’s, the utterance of “This is a wonderful night”, is actually a bit more complex, as the very act of uttering that sentence contributes to what the nature of the state of affairs is. That is, one has to take into account the illocutionary nature of the utterance: refrain from uttering it at the right moment in the presence of your loved one and suddenly the night might not turn out to be quite as wonderful as it could have been after all. Logically, this is no big deal, since such effects that the uttering of the sentence introduce may well be parts of the model of the propositions. In other words, sentences and signs can

⁴ See Pietarinen 2007. A further consequence is that the differences between the semantic and the pragmatic approaches to meaning appear insignificant from the game-theoretic standpoint, just as Peirce’s trivium was presented to be: that which is semantic and that which is pragmatic cannot be distinguished by the rule-governed features of game theory. The difference is whether the players *know* the content of the solution concepts and strategy profiles in the game-theoretic analysis; an epistemic addition turns on pragmatic elements of uses of signs.

very well serve as their own models. Counting signs among the elements of the models of which they are the signs is not only a conceivable and consistent deed in semantic theories, but something quite often appealed to in complex representational tasks.

There is, however, a further problem in assuming the universality of transitive processes to govern the identity of dynamic objects. Look at Pape's Principle of Object Identity. One cannot help feeling that Pape is attempting to construct the identity of dynamic objects out of the sign triads, a construction internal to the inferential relations between signs. What is an identity relation represented to obtain between two objects, and what is a sign relation connecting two signs? Peirce's signs are representations of objects with respect to the interpretants that they produce. Now suppose, charitably, that there were such sign relations connecting signs, perhaps given by acquaintance, common ground and collateral information. Note that those identities and sign relations are presupposed by the process of semiosis, as the example of the fire in Megara that also Houser discusses in his paper (see below) makes evident. Pape thinks that a sign-relation is "connected to a possibly unlimited sequence of interpretations", but *interpretations are not unlimited*: there is a crucial difference between different kinds of interpretations, especially those given either by immediate or representative interpretants. While the former could somehow be thought of as a sign that shares its object with the object of the previous sign triad, the latter is an entirely different kind of an interpretant that, as a sign, tells us *how* the previous sign is related to its object. As soon as it does that, a habit-taking tendency takes over and the process comes to a halt. For the purposes of signification, dynamic objects hang out much better with those other, non-immediate interpretants than with immediate interpretants.

A further problem is that if Pape's presumed triadic, transitive inferential process is something that could in fact capture the representations of identity relations (again, this is a charitable reading, since it is not clear at all what those relations could be), then the objects in the sequence of triads in which the interpretant of the previous sign becomes or is connected to the sign which interprets the previous sign, are the same. They can be identified as such, so far as Pape's definition goes, since there is "an independent second sign-relation" for which the identity relation holds. But since Pape has left the other varieties of interpretants besides immediate interpretants out of the picture, after four applications of the interpretants being "connected by the sign relation" to a further sign, and after having ascertained ourselves of the existence of five identities between objects that we get from working backwards from the last "sign-relation connection" to the first, we have come to connect the interpretant of the fifth triad to the representamen of the original triad. That is a cycle, a simple group of triads. Semiosis becomes a trivial, primitively recursive closed system, with identical objects concentrated at the centre of that structure that looks like a carambola slice. Something has gone terribly wrong.

Should we not conclude that triadic sign relations and transitive inferential relations ought not to be too closely assimilated? Should we not conclude that semiosis is an

open system, where information external to signs matters as to its representational capacities? Should we not conclude that there are facts of the matter, such as structures of the models and the universes of discourse of those models, that have the power to make representations true or false?

To avoid unnecessary rejoinders, I am not arguing against transitivity of teridentity. Transitivity of teridentity is another, remarkable property which in its generalized form, in which sign relations embody relational generality (a higher type of generality generalizing all possibilities) gives rise to the structure of continuum.

The processual nature of semiosis that Pape emphasizes in his paper is also the topic of **Juuso-Ville Gustafsson's** "Triadism and processuality". Gustafsson's paper examines the close affinity of Peirce's triadism and the process philosophy of Nicholas Rescher. Does the irreducibility of processes presuppose irreducibility of the triadic nature of signs? Gustafsson argues that accepting triads in one's semiotics leads to accepting process metaphysics. The correct notion of metaphysics in semiotics is, therefore, to consider the ontology of signs from the point of view of process metaphysics. Are we compelled to accept triads in semiotics as indecomposable and irreducible elements? The negative version of the irreducibility of triads has been discussed at length in the literature (see e.g. Houser *et al.* 1997). As a theorem of systems of topology or a well-formulated logic of graphs its validity is incontestable: there is no way a genuine relation of teridentity, with a point of teridentity as a graph expressing that relation in it, can be conjured up from zero, one and two-place relations alone. Identities between two are simple identities; between three they are genuine identities. Such teridentity is a graph-theoretic concept of a real identity between three relata that consists of a spot reduced into a dot of teridentity upon which three lines of identities meet at their ends.

These fundamental valency considerations are the first considerations to be had in Peirce's doctrine of categories, the cenopythagorean categories. If every element of the phaneron was a monad or a dyad, no triad could ever be constituted from them. Elementary concepts are irreducible, and those are the triads, or more accurately speaking the relations of teridentities, and even more accurately speaking, graphs of "indefinitely multiple identity" (MS 490; Pietarinen 2015b).

If so, there is no process metaphysical consideration reaching further beyond the valental analysis of the basic categories. Those processual notions must presuppose the triads, and not the other way around, just as Gustafsson argues in his paper. Metaphysics is the last philosophy, and whatever is discovered in mathematics, phaneroscopy or logical analysis must precede its findings.

To what kind of action or process does the triadic sign give rise? Pape's view is that the relations between sign triads are inferential, and presuppose transitivity. According to Gustafsson, the sign triad is a functional unity. Since function is action, signs could be characterized as triadic processes. Does it make sense to ask what further ontological commitments are there in functional unity as a process? Does

semiotics need an ontological framework to be complete? Is a Rescher-style process metaphysics that takes substances or objects constituted by actions and processes of any help here? I cannot help feeling that claims made on behalf of irreducible process metaphysics are more narrowly construed than those concerning the irreducibility of the sign triad, as the former assigns metaphysical status to processes by virtue of existence claims. Anything Rescher's process ontology claims is translatable into Peirce's semiotics: owned vs. unowned processes are distinctions between the actual presence of utterers and interpreters for objects and interpretants vs. the *would-be* interpretations, just to give an example of how such a translation would go. Signs represent reality, and no additional ontological duplication of those representations of relation appears compelling.

Moreover, signs are linked to interpreting quasi-minds without which they could not do the job they are supposed to do. This connection is not obviously there in either Rescher's conceptual or ontological process worlds. Signs are "owned" by minds, to twist Peirce's terminology. Yet minds are also processes: they are "sign-creatories" connected to "reasoning-machines", as Peirce once put it. Nothing precludes taking the notions of the minds, utterers and interpreters also as processes.

With all its cash value in the light of contemporary sciences that tend to theorize everything in terms of processes, action and interaction, fields, forces and occurrences, process ontology is an afterthought. There are no genuine, non-degenerate processes without sign triads. Material and physical things that make existence or occurrence claims are conceived through degenerate triadic and dyadic processes. Lacking life, purpose and meaning, physical and non-biological processes can well be counted as processes but they are not triads.

Pan-semiotics is not a view of contemporary biosemiotics, as well argued in Terrence Deacon's works. Without delving into the details of Deacon's arguments on the human/animal symbol use and the co-evolution of language, mind, cognition, brain, culture and society, let me remark on a couple of points in **Tyler James Bennett's** exposition of Deacon's views in "Memes are not signs: *The Symbolic Species* and the semiotic life cycle". It would require additional arguments to be convinced that the chimp experiments demonstrate significant differences between infant human and animal behaviour and their differences between decisions in presence of various stimuli. Many other experiments demonstrate that also human beings are more liable to discount the future, even hyperbolically so, when the promised rewards (money, naturally, for human beings) are visibly on the table. If it is easier for chimps to arrive at rational decisions when the rewards are concealed and merely encoded in some way, it is equally so for human beings. A minor point is that the encoding given in numerals or similar signs directly connected to their rewards is an indexical rather than a symbolic form of encoding. Another of Deacon's points is that symbols that spread in cultures come with specific disadvantages: an example is self-replication or "memetic" propagation of symbols that

dissociates symbols from the communities who by default are expected to cultivate them by ever-improving critical interpretations of their meanings. Maybe such a phenomenon of brainless self-replication takes place in dogmatic belief formations that, when passing unchecked, result in atrocities and pseudo-science. Still, I fail to see how it could follow that self-replication or memetic copying, with or without support of a broken analogy from genetics, would turn dead symbols or monotonous mantras into zombie-like pseudo-signs or non-signs. The relevant distinction is that of types and tokens of signs, not between living and dead ones.

Another misplaced analogy is nevertheless identified by Bennett in his criticism of Winfried Nöth's semi-literal association of legisigns with living things. Nöth claims that legisigns are more similar to life than dissimilar to it. If I am more similar to my male colleagues than to my sister-in-law, does that mean that the concept of my extended family ought to be relocated to my departmental chair? Aren't crystals in so many ways more living than colloids, as Joseph Wood Krutch masterfully essayed? Symbols grow, but so do buildings, balloons and red giants. A perfect replicator dynamics would have to replicate the entire context, physical, cognitive and temporal, of the sign for it ever to degenerate into a non-signifying non-sign. A brain-in-a-vat thought experiment with endlessly iterating simulations of its laboratory context strikes me as a toy experiment compared to that possibility.

A few further clarifications concerning Bennett's paper may be in order. Although 'unlimited semiosis' may have become a common statement among semioticians, it was never a household notion in Peirce's works. Generation of interpretants ceases as soon as one reaches the final (or ultimate, logical, eventual or representative, pick your favourite) interpretant, as those amount to the tendency to take habits. Habits of actions are not signs: a habit of a habit is that habit itself (on this point, see Bellucci, Pietarinen in press a, and the paper by Stjernfelt in this issue). Bennett asks what the missing third, the 'final object' would consist of, were it to exist. Bellucci's and Pape's papers already exhausted the objectual divisions: as to the absent third, even the idea of what the final object could be like cannot be made coherent or comprehensible. It is not even an entity that could be hypothetically contemplated: hypotheticals, counterfactuals, real possibilities etc. are of course Peirce's tools of trade that do not exist, but for that very reason ascertain the reality of the sign triads. In contrast, an absolutely context-independent object identical across all possible worlds is no better than a God or an Allah or 72 Virgins – simple confusions of thought that promise but an eternal freeze. Reality and fiction would be indistinguishable, and we would all be living in a computer simulation, which itself is a simulation.

Mere replication is a poor dynamics in co-evolutionary processes. The really interesting things start to emerge when learning begins to guide evolution. No biologist contests the reality of the Baldwin effect – more accurately termed the Peirce–Baldwin effect (Pietarinen 2011a) – and much new is learned every day about how information

in the environment becomes a genetically inherited trait.⁵ The crucial thing is that it is the *tendencies* to learn that become inheritable: not the task itself, but the Peircean habit epigenetically projected to offspring.

Much of the confusion around Deacon's appropriation of Peirce could have been avoided by Deacon's early adoption of habits of action as the cornerstone of his co-evolutionary accounts of meaning, symbols and legesigns; an omission in *The Symbolic Species* I have pointed out earlier (Pietarinen 2012). His 2012 sequel, *Incomplete Nature*, nevertheless follows the recommendation and takes up the theme of habits, if only as a 'constraint'. That concept, however, weakens the Peircean claim. For Peirce, habit is not a negative constraint, but an increase in the degrees of freedom. It is precisely in the habits of action that one finds a new beginning: life thrives when there is stability, homeostasis, evolutionary stable equilibria. As every complexity theorist knows, stability emerges from diversity and decentralized processes. Take also that *habits are not signs*. Yet if memes were only those collapsed, mechanized and algorithmic forms automata and replicator dynamics produce, they surely could not be associated with Peircean habits. Bennett's central claim is that memes are not signs either, but this poses a problem as they have little else to escape into. Is there any niche for memes-not-signs in Peirce's theory? I do not see there is, and I hold out hopes for constructing one.

What entitled Peirce to make such high claims on behalf of his least explored part of the method of semiotics, the speculative rhetoric? Pape already noted in his contribution that a comprehensive theory of propositions should not overlook that important edifice of Peirce's theory of signs. Here I feel that we can get a better grasp of Peirce's overall ideas and intentions not by an exegetic reading of his own texts but by putting his incomplete suggestions and emerging insights into a novel perspective, and by pushing his ideas further than he was able to do and by relating them to some contemporary and much later inventions. The ground that Peirce prepared is well suited for making such one-and-the-half truths concerning his preliminary ideas. For example, it is remarkable how well Peirce understood the nature of science, which continues to surprise as his views surpass so much of the 20th-century philosophy of science. Being in a living touch with the late 19th-century sciences must have done a world of good to anyone's philosophical thinking. In a passage quoted by **Mats Bergman** in "The *highest* branch of logic? On a neglected question of speculative rhetoric", Peirce expounds science as a "living process" that is not sufficiently explained by attempts to find general conditions of the truth of its representations. Here Peirce disvalues the much later attempts to define truth-conditional semantics for the statements of scientific theories. To really philosophize about science, Peirce continues, it is "necessary further to study the laws of the development of scientific

⁵ And so information is obviously observer-relative as Searle has consistently argued throughout his life, while the Floridi-Bostrom accounts can only speak about its degenerate form, the context-free and observer-free, non-biological dyad.

representations”. Such study belongs to the purview of speculative rhetoric. Here it is easy to nod at various practice-based approaches to the philosophy of science that have emerged of late, including the work on modelling and computational simulations as examples of those practices that are not directly involved in finding out the truths of scientific models and representations. What is equally remarkable besides such contemporary acquaintances is that it is logic that Peirce thought to be the right method of study in any philosophy of science in practice. Practices are no exclusive territory of sociological, socio-psychological or anthropological field studies; they recommend a logical approach by means of which to discover the laws of scientific representations and the general use of signs involved in those representations.

For example, the study of notations pertains to speculative rhetoric. As any creative scientist is ready to acknowledge, improvements in notation are the key to novel discoveries. Every truly important step in mathematics, for example, has been a step in the improvement of notation. And it is the task of logic to study the nature and character of notation, including notation for the very language of logic itself. This explains why Peirce was led to exclaim that a “colossal doctrine” awaits us in the apparently narrow context of logical algebras: the thought of a colossal doctrine occurred to him while he was reviewing Schröder’s work on the algebra of logic which Peirce felt Schröder had partly taken from him. What justifies such a high estimate of the field that was still in its infancy? One answer could be that overcoming the loose and ultimately harmful use of notation in logic avoids one falling back on universalist presuppositions about meaning. Thus the investment in notation pays back in the “many-worlds” viewpoint and methodological pluralism: the universalist “one-world” logic would, in contrast, be impotent in theorizing about how languages and notations link to the world and how those links could vary with new interpretations and new notations. Thus Schröder in Peirce’s view ultimately closes the path to logical inquiry in his overly formalist approach that introduces a superfluity of logical signs,⁶ and for those reasons succeeds neither in logical analysis nor in such “broader applications” of logic which Peirce was about to develop in his new logic of graphs, the theory of signs, and speculative rhetoric. His discoveries came to be precursors of modern model theory and the theories of relevance, speech acts, Gricean logic of conversation, and the related semantic, pragmatic and cognitive theories of assertions, in some cases even exceeding the conceptual thinking behind these later developments.⁷

⁶ “While that ‘Algebra of Dyadic Relations’ with which Schröder fell so in love was obliged to provide four fundamental symbols of operation to account for the composition of concepts by non-relative aggregation, by non-relative multiplication, by relative aggregation, and by relative multiplication, the System of Existential Graphs includes all of these under the sole mode of composition it recognizes, – and without any special symbol; with but the ligature” (Charles Peirce to William James, February 26, 1909).

⁷ See e.g. Pietarinen 2005a; Pietarinen, Bellucci in press.

There is a lot more that is fresh and provoking in Peirce's comments on speculative rhetoric. In a very unambiguous sense speculative rhetoric is the first, starting point of inquiry. One has to begin inquiry with some vague ideas of meanings not yet regimented in the system of grammar or critics. A parallel case is that arguments, as perhaps the most complicated of sign classes, are the real backbone of scientific progress. In non-experimental sciences, which there are many even in natural sciences, arguments may be all that one has. Moreover, a scientist seldom makes a leap with the evidence already in his or her possession. To make an abductive guess, one needs to look for alternative and collateral sources of evidence. When the data already acquired has been analysed and exhausted, and when the old facts have run out, new sources of information are called for in order for the new and surprising facts to be observed and inspected. Here the resources of rhetoric prove to be of utmost value. One can use its resources to look at old data from new points of view, to devise new notations to gain those perspectives, and to interpret sparse and anecdotal data if nothing else seems forthcoming. All these are applications of logic, conceived in the wide sense of transferable skills that hone our scientific intellect and sensitivity, strive to make complex meanings communicable, enable progress where progress seems unattainable, and prepare one for the inevitable abductive leaps that need to be taken before long. It is no trivial task to have others to share your scientific thoughts and ideas and improve upon them, including the future self of your own thinking, let alone the communities of not-quite-like-minded scientists or the ordinary folks one wishes to source for some extra grains of mob intelligence. Speculative rhetoric is the indispensable force behind creating the innovation ecosystems that currently are so much in demand, where the minds are rightly nurtured, ideas grow and flourish, and hedges and obstacles for their transmission and communication are kept minimal.

Here is an example of how Peirce might have thought about the curious interplay between rhetorical elements and grammar and critics of logic. The example concerns the interpretation of lines of identity in his theory of existential graphs:

If a Line of Identity does not abut upon a Cut, then that extremity of it from which the motion of the Graphist's pencil starts will be its hinder end, while the extremity at which the motion ceases will be the forward end. But since the Interpreter is at liberty to take it the other way, it would be a grave logical fault to add any barb or other mark to show which way the line faced, because it would be introducing a rhetorical element into what is designed to be a purely logical diagram. (MS 293, 1906–1907, PAP)

Peirce appears to think that denoting the direction of the lines is not purely a grammatical or logical but a rhetorical element, and that such an extra notation should be avoided in the language of graphs. The matter is clearly so as soon as there are cuts in the graphs, since the interplay between the nested system of cuts and the lines

defines the direction of interpretation in graphs, namely their endoporeutic, outside-in direction. If there are no cuts, then what the direction of the lines is is to be left to the theoretical agents of the Grapheus and Graphist to decide (Pietarinen 2013), as the direction does not matter to the signification of that line. Indeed in all the examples that Peirce gives of his existential graphs – which may top 10,000 tokens – he draws the lines without direction – in all but one, that is. In MS 430 (see Pietarinen 2015a) he entertains the possibility that one needs to mark a nodule or a barb at one of the ends of the line to denote the direction of interpretation, or rather to reverse the default, endoporeutic direction. But why is such a reversal needed? The truth is that there are meanings that are not elementary, namely not expressible in the standard first-order logic or in the Beta part of existential graphs. The point is not to capture intensions, modalities or higher-order notions of abstractions. The point is to capture, using only the extensional signs of first-order logic (the signs of Beta graphs) such meanings that at first sight seem to defy such expression; meanings that are *between* the first and second-order representations. This is surprising. Without going into the details of what these meanings are or were suggested by Peirce to be,⁸ the lesson is that one cannot fix beforehand what pertains to rhetoric and what to critic or grammar. Rhetoric suggests that there are new meanings, and preliminarily proposes possible new signs to express them. At this point it is not yet clear whether such new signs are really needed, such as adding a barb or a nodule on the line to reverse its direction of interpretation. However, later it turns out that they might be needed after all, and that the new notation in question was not merely a rhetorical device but one that matters to the analyticity, expressivity and truth.

A lot more should be said on what kinds of factors there are that render signs effective and what the subsequent research has suggested them to be. Pragmatics proposes some cases in point, as do those areas of cognitive sciences and related fields that seek to understand mental-to-mental causation and the effects from mind to mind. In this, emotions and feelings may be unavoidable. But are they altogether dispensable in inferences and in scientific work, as one often hears to be asserted?

Few scientists would deny feelings playing an important initial role in lifting inquiry off the ground. When Richard Feynman was about to make a guess on a difficult problem in physics he would immediately feel seven other rival possibilities that could also be guessed. How to choose the right ones to be pursued as those abductive hypotheses that could be submitted to test? Feelings and temptations might have to be resisted in the right way, too. The early stages of a truly novel inquiry are full of uncertainty and noise. **Jean-Marie Chevalier**, in “The role of emotional interpretants in Peirce’s theory of belief and doubt” sees feelings as reasons to believe in a proposition as it is those feelings that give rise to the calm state of non-doubt

⁸ See Pietarinen 2004a and 2015a for some explanations, and MS 504 (*Peripatetic Talks No. 6*) and MS 430, to appear in *Logic of the Future*.

that inquirers strive to attain. Chevalier seeks support for such scientific or epistemic emotivism in Peirce's theory of emotional interpretants.

The attempt appears to fly in the face of Peirce's own remarks, who opposed resorting to any deceitful "feeling of logicity" in reasoning and rational inquiry. It is not feelings that cause doubt to vanish, but the successful following of the logic of the scientific method. Whatever emotions there may be are at best epiphenomena of that success. Peirce moreover states that beliefs have no place in science. Scientists do not believe in their conditional propositions, they *hope* that what they have guessed or conjectured would turn out to be the case in the distant future (Ma, Pietarinen in press). Those conjectures do not have the luxury of reaching the status of beliefs, at least not in the lifetimes of any single person, project, or a research team. Entertaining hypotheses and moving from one to another is not to attribute beliefs in them. There is little room for belief in science, and scientists would be very disappointed if they had to accept something even stronger, such as knowledge.

True, in Peirce's actual experimental scientific work and in his remarks on his work feelings and emotional interpretants have a marked and even an evidential role to play. Confidence levels and derivations of critical significance parameters are omnipresent in contemporary experimental science that is fundamentally statistical. Those levels and estimates are not merely subjective or personal, however. The 1884 Jastrow–Peirce experiments already supplanted intuitions by estimates of degrees of confidence in tactile sensational feelings for groups of subjects. Their early research exposed how unconscious thought affects our judgments and decisions. The emotional interpretants may even be the only effects of the signs. But it is important to recall that this happens in artistic contexts rather than in rational inquiry, reasoning and experimentation. In non-artistic contexts emotional effects come to be allied with other kinds of interpretants. It is certainly true that semiosis can cease at the level of firstness with the production of emotional interpretants, but in that case the interest lies in the question of what it is that makes the semiosis cease. There must be more to the emotional interpretants than the mere qualitative aspect of firstness.

There obviously are beliefs that feel good. We are full of them. Wishful thinking and self-deception are cases in point, and a bias towards optimism is a common characteristic of the human mind that enables us to undertake projects and overrun budgets that otherwise would have been better controlled. It is doubtful whether there are any evolutionary benefits to such non-pathological biases or whether they merely manifest the sadly incomplete nature of our neurophysiological, social and cultural development. But be that as it may, such biases and irrational cognitive issues have little to do with real scientific attitudes,⁹ as the formation of scientific attitudes takes

⁹ This is not to deny that scientists would not be liable to confirmation bias or its subtypes such as experimenter's bias or attentional bias. But unlike other methods of fixing beliefs, the self-correcting method of science helps to mitigate the effects of such biases, should the

place at the pre-belief stage and has a definite logical form. That abductive schema represents the logical reasoning for discovery and therefore has little or nothing to do with the psychology of beliefs. Emotional interpretants, if anything, communicate us about our own twisted understanding of what the fake-free and sham-free reasoning ought to be about. Beliefs that feel good have something wrong with them. Once we become self-aware and recognize this sorry state of affairs, a doubt is produced and those beliefs and the processes that generated them are submitted to further scrutiny for correction. Science needs to remain dull and dry.

There are two aspects of a Peircean theory of emotions that I find particularly valuable. First, while Peirce had no time or patience to develop upon his brief remarks on emotions and emotional interpretants, he took them to have sufficient propositional content to be expressed and that content analysed, not in natural language, but in the language of graphs. A deeper analysis of what belongs to Peirce's preferred groups of notions concerning firstness: tones and qualisigns (qualia), immediate consciousness, and logically indecomposable elements of thought reveal a rich theoretical structure within which emotional interpretants are embedded. Peirce even wanted consciousness to be a subject matter for logic. Objects of consciousness such as "the feelings a symphony inspires or that which is in the soul of a furiously angry man in [the] presence of his enemy" can, Peirce held, be "perfectly expressed" in the various logical graphs he pioneered, especially the tintured graphs suitable for representing a range of non-declarative assertions.¹⁰ As emotional interpretants serve interpretational purposes, the question of the truth and falsity, rightness and wrongness, or being better or worse, are evaluated in the light of what is there in the universes of discourse of heraldic tinctures that consist of a variety of non-declarative and non-extensional entities, capacities, tendencies and intentions. Among such entities Peirce lists subjective possibilities, freedom and ability, and whatever is commanded, compelled, interrogated, rationally necessitated, or resolved upon (MS 292). Namely, the evaluation is determined by what the dynamic objects are in those

future inquiry reach the level of beliefs in scientific propositions beyond the pre-belief stage of weaker attitudes of making conjectures. The importance of being vary of such biases cannot be overemphasized, as there is no better way to screw up an experiment than to expect it to turn out in a certain way while designing it.

¹⁰ "There are countless Objects of Consciousness that words cannot express; such as the feelings a symphony inspires or that which is in the soul of a furiously angry man in [the] presence of his enemy. But all these can perfectly be expressed in Graphs. Let us call all that ever could be present to the mind in any way or any sense, when taken collectively, the Phaneron. Then every thought is a Constituent of the Phaneron, and much besides that would not ordinarily be called a Thought. And therefore there can be no better instrument for thinking about Constituents of the Phaneron – which is itself too evanescent for definite comprehension – than to think about Existential Graphs" (MS 499(s), "Z", Monist 1907 Scheme).

domains, or what there is in the provinces of the areas of tinctures graphs, as Peirce explained his late multi-modal theory of existential graphs. These graphs, especially as they concern the variety of assertional signs (the ‘phemes’), are the ultimate extension of Peirce’s theory of propositions and dicisigns.¹¹ They thus serve to analyse and make precise the possible inferential relationship in what is only loosely characterized as the component of feelings or judgments in emotional interpretants.

The second point concerns an open question that I find of immense theoretical importance, and to which **Henrik Rydenfelt’s** “Emotional interpretants and ethical inquiry” tenders a fascinating contribution. Peirce spent the rest of his life trying to demonstrate what I call the *semeiotic completeness* of his architectonic. Semeiotic completeness states that everything that is the conclusion in critics is provable in speculative grammar. But first, to reach completeness, one needs to first prove the soundness. Here Peirce reached this central metalogical result of the relationship between the two levels of the logical system, grammar and critics, in his 1903 Lowell Lectures.¹² What the soundness of reasoning consists of, he manages to show, is an establishment of a passage from the clause that an argument is valid *if for any object that the premises represent, the conclusion represents it as well*, to the clause that an argument is valid *if for any object that the signs represent, the interpretant represents it as well*. We get the latter clause from the facts that the premises are a sign of the conclusion and that the conclusion is the (immediate) interpretant of the sign. In sound reasoning, one is always entitled to move from the former to the latter. Now conclusions are interpretants. But how about the other direction? Here some complexities present themselves. Are, for example, emotional interpretants conclusions? It is not obvious that they are. Rydenfelt’s paper provides some reason to think they are. Namely, the suggestion is that there are final emotional interpretants that serve important cognitive and interpretational purposes in inquiry. (Rydenfelt focuses on ethical inquiry, but reasoning and logic belong to normative sciences and repose on ethics.) If those purposes are well defined, also the associated cognitive and interpretational processes are stable and the emotional interpretants could thus well be conceived as conclusions of rational arguments concerning normative questions. Rydenfelt argues

¹¹ “[T]he ‘Pheme’, embraces all Propositions; but not only Propositions, but also all Interrogations and Commands, whether they be uttered in words or signalled by flags, or trumpeted, or whether they be facts of nature like an earthquake (saying “Get out of here!”) or the black vomit in yellow fever (with other symptoms of disease, which virtually declare, or are supposed to declare, some state of health to exist). Such a sign intends or has the air of intending to force some idea (in an interrogation), or some action (in a command), or some belief (in an assertion), upon the interpreter of it, just as if it were the direct and unmodified effect of that which it represents” (MS 292, Draft of Prolegomena).

¹² The proof is found in the first, unpublished and undelivered lecture, MS 454, not in “What Makes a Reasoning Sound?” published in the EP 2.

that the purposes of feelings are three-fold: they can be the *kalos*-like ideals sought for their own sake (which may require us to take a brief excursion to Peirce's esthetics), or practical, or cognitive. This nice new trichotomy somewhat furthers Peirce's own account. It is the thirdness of this classification, the cognitive or the intellectual, of the purposes of feelings that transpire in final emotional interpretants. These interpretants are real just as the habits are, and make sense of what the true and false (or better and worse) emotions are according to the creative intentions of the signs' producers.¹³ What is meant by false emotions it is meant not that the experience of happiness or horror would not be there, but that such experiences would not overlap with the intended interpretant of the sign of those feelings. Lacking veracity, some people simply would not experience the same fabricated emotions. Transcranial magnetic stimulation either fails to produce hallucinations or experiences comparable to religious beliefs, or else those experiences would be distinguished as different from others that are grounded in reality with ease. Dawkins never experienced the God delusion no matter how hard he tried.

But how does such a reasoning work? All rational arguments, even in ethical inquiry, must proceed according to some reason; that is, there is some leading principle according to which we must reason. Now habits are such leading principles (Bellucci, Pietarinen in press a). If ethics, as Rydenfelt's paper suggests, and as Gustafsson and Pietarinen (in press) also conclude, is amenable to investigation according to the scientific method, those leading principles in normative arguments are habits of feeling.

And if no further missing varieties stand up in Peirce's classification of interpretants that cannot be conceived as conclusions of an argument then we would be ready to conclude semeiotic completeness: speculative grammar and critics are the two theories, levels or perspectives to talk about one and the same thing.

We should not rush to the conclusion that speculative rhetoric fits this completeness picture, not quite as yet, that is: by its very nature it is much more loosely characterized as a field of study than the grammar and critics. But this is precisely as it ought to be, given that any investigation begins with vague meanings that come to be clarified in the process through conceptual growth. Yet Peirce presumed all three to form a unity, and so the demonstration of completeness is not complete before speculative rhetoric is brought in. My example above concerning the element that Peirce thought to be a rhetorical one in his theory of graphs, and which future research showed to be an important element of the logic proper, serves as a confidence builder towards the unity of the trivium. Another is that many aspects of rhetoric are readily there in the area of speculative grammar: one finds for instance a rich classification of speech

¹³ Furthermore, cognitive signs also presuppose real objects: "The signs it represents are signs presented as cognitive, that is as conformed to a real object". By real, Peirce means "that which is such as it is whatever you or I or any generation of men may opine or otherwise think that it is" (MS 498, see Pietarinen 2015b).

and hear acts in speculative grammar, while their nature is investigated in speculative rhetoric (see Peirce's paper in this issue).

In this light it is rather surprising that neither Rydenfelt nor Chevalier take the reality of habits of feelings to play any part in their respective arguments. Yet habits of feeling are all-important in Peirce's normative theories: Peirce actually defined esthetics as "the theory of the deliberate formation of such habits of feeling" (CP 1.574). That there are habits of feeling is central to the understanding of what Peirce intended to accomplish with his pragmatistic approach to normative sciences. I have argued (Pietarinen 2009) that the final (or ultimate, eventual or representative) *esthetic* interpretants are such generalized tendencies or habits of feelings. If that argument holds, it is patent that final emotional interpretants are habits of feelings, too, albeit not of course the same sorts of habits.¹⁴ After all, ethics reposes on esthetics in Peirce's classification of sciences.

In an important unpublished manuscript entitled "The basis of pragmatism" (to appear in *Logic of the Future*), Peirce tells us that "habits, so to call them, must be capable of being modified according to some ideal in the mind of the controlling agent" (MS 280, 1905). Now such habits are rules for thinking about, and thus rules for proper conduct concerning, the meaning of signs. Habits are modified with reference to the purpose or ideal that agents have in their minds, but such an ideal is at the same time part or feature of controlled habits, habits that have to do with feeling and not solely with thinking or action. Therefore, the habits of feeling that these final esthetic interpretants give rise to are controlled and criticized as well as self-controlled and, in Peirce's odd terms, "hetero-criticized" (CP 1.574). These considerations, *mutatis mutandis*, pertain to final (or logical, ultimate, eventual, representative) emotional interpretants. And over and above deliberate control habits of feeling need control with respect to themselves, as well as control with respect to those habits that criticize the forms of self-control. "When one reasons, it is that critical self that one is trying to persuade", Peirce comments in CP 5.421. This move makes normative interpretations

¹⁴ In a nutshell, the argument is this. (1) Signs are vehicles of communication. (2) Art is a form of communication. (3) Art has meaning and purpose because, among other systems of signs, art functions as a system of signs. It functions as a system of signs because it interprets information that we acquire in experience. (4) Artwork can have objects through interpretants. (5) Such 'esthetic' interpretants by which art can have objects aim at answering *how*-questions rather than *wh*-questions. (6) Lastly, 'Final esthetic interpretants' are habits of feeling and thus general; they are species of habits of action associated with the creation of artwork. The conclusion that we arrive at is a paraphrase of Peirce's famous assertion that esthetics is a normative study of "ideals *qua* ideals". In other words, esthetics is scientific inquiry on the subject matter of what is "most admirable in itself regardless of any ulterior reason" (CP 1.611). The proper pursuit of such inquiry needs, as argued in Pietarinen 2009, the introduction of the concept of a final esthetic interpretant. This is in line with the emergence of 'final logical interpretants' in Peirce's pragmatistic theory of signs.

a rational activity free from singular accidents of particular minds or human minds that perform evaluations in actual interpretive situations. Such interpretations involve reasoning, but that reasoning is not only a conscious, self-controlled action directed towards ideals but of the nature of “taking a habit” (CP 5.440). Taking a habit is a rule-governed feeling of a certain kind. Ideals, on the other hand, are “must be” (CP 1.574) generals, habits of feeling in certain ways in certain kinds of situations. And from Peirce’s standpoint, it is then the theory of such formation, acquisition and modification of habits of feeling that characterises scientific and pragmatistic study of normative ethical inquiry.

Habits of feelings are thus indispensable in an adequate theory of pragmatistic normativity. They also answer some common worries that follow from taking assignment of values to normative statements dependent on emotions and gut reactions. Perceiving a young muslim girl screaming while her genitals are mutilated with a sharp knife has factual content that leads, through abstraction and thus involving reasoning, to a conclusion that cutting sensitive parts of your body with a sharp tool has a general tendency to cause pain. Our experience tells, further, that it is overwhelmingly better not to feel continuous and possibly life-long physical and emotional pain, suffering and distress. You can further demonstrate the immediate reactions by performing an fMRI scan of the victim’s brain states – or maybe also your own – but that is only a condiment to the judgment that has already been formed. Make no Hume here: no one is claiming to deduce or demonstrate the ‘ought’ from the ‘is’ – the leading principles of these abstractions are the habits of feeling that have generality and thus govern the reasoning, but they are not themselves elements (premisses) of that reasoning. In semeiotic terms, in normative reasoning no final ethical interpretant can be considered as a sign without employing in this reasoning that very same ethical interpretant. A final ethical interpretant is thus un-eliminable just as final logical interpretants are: no matter how many times you transform it into a sign it continues to act as a habit of feeling.

An important principle behind the previous argument is exposed in **Frederik Stjernfelt**’s brief and eminently useful “Blocking evil infinities: A note on a note on a Peircean strategy”, which every semiotician, past, present and future, ought to read. There is only a brief comment that I need to add to it. One might wonder that hypostatical abstraction, which adds an arity to the abstracted predicate by quantifying over the basic relation is itself subject to the ill-named ‘infinite semiosis’. Stjernfelt rightly explains that here the *nota notae* kicks in, as “standing in a relation to” and “standing in a relation of standing in the relation to” do not differ in meaning. My remark is that it is one of the masterful findings of category theory that the relations of morphisms (functors over objects and morphism to relate categories) and relations over functors (natural transformations to relate functors) are both needed for a complete theory, and it is the latter that has an irreducible status. The generation of relations

of relations halts at natural transformations, which are the thirdness of relations (take categories with objects and morphisms as firstness and the functor category as secondness. A curiosity: a functor from an index category to a category is known as a *diagram*). The reason is that for ordinary categories, a composition of natural transformations is itself a natural transformation! It is *nota notae* all over again, now on what Peirce would have taken to depict relational generality, a teridentity as it occurs in category theory.

Such categories and mappings between them have their focus of interest in the commutativity and associativity properties. Transitivity comes into play with teridentities, with natural transformations as generalized isomorphisms. Category-theoretic diagrams are icons that add new structural features to them as soon as the diagram of the category commutes. Thus category theory is a modern Peircean way of promoting relations and mappings as the first-class citizens.¹⁵ A related point is that the arity of “standing in a relation of Z to Y” involves a lower-order relation Z that has its own arity. In Peirce’s logic of potentials, which is his most serious attempt at the logic of abstraction (there were other attempts throughout), the “standing in a three-place relation” (“Y stands in the triadic relation X to Z for W”, MS 478) is the ultimate hypotactically abstracted relation that is ever needed: provided that the irreducibility thesis generalizes to potentials then all other abstractions can be generated based on “standing in a three-place relation”. As far as I know no one has attempted or even proposed the question of proving the generalized irreducibility thesis with respect to the higher-order logic of potentials, however.

Stjernfelt concludes that the primitive or irreducible ontology – the “rock bottom”, though not the “foundations” in any old-fashioned sense as pragmatism is anti-foundationalism – consists of relations (though presumably only those conforming to *nota notae*), continuous predicates, leading principles and habits. This suggests a healthy incentive to metaphysical investigations. What else is there? I would add that elements of logic needed to analyse that furniture are there: phaneron, the phemic sheets, quasi-minds, universes of discourse, teridentities, rhemas of second intention, abstractions and potentials (second-order entities), as well as the *tig*-signs (Pietarinen, Snellman 2006), namely thoughts, intellectual concepts and generalities (at least insofar as those also conform to the *nota notae*), as it is on the basis of such *tig*-signs that Peirce set out to prove his pragmatism. But that is where our rudimental furnishing of the world soon has to come to an end. The rules of inference, and the basic laws of logic, in contrast, are man-made, which of course does not imply that their validity or justification would depend on the vagaries of a single mind or on a psychology of a reasoner. “Our Reason is akin to the Reason that governs the Universe”

¹⁵ Calling it a structuralist theory would not be terribly misleading if not confused with semiological structuralism based on altogether different ideas quite diametrically opposed to Peirce’s.

(Charles Peirce to William James, December 25, 1909): two interdependent reasons to justify the rules and laws of logic without circularity or logocentric predicaments.

It may not be so easy to resist the temptation and switch to some all-encompassing principle that sorts everything into tidy compartments. Chevalier cautions against such approach in his comment on **Marc Champagne's** "A less simplistic metaphysics: Peirce's layered theory of meaning as a layered theory of being". Champagne uses a modal principle – as such one quarter of Kant's pure concepts of understanding – to partition ontology *tout court* into possibilities, actualities and regularities. This is a descriptive approach to the method of metaphysics, which contrasts the revisionary one that aims at dispensing with any categories, postulating instead some direct access to the constituents of the world. Methodologically, the descriptive one is closer to Peirce's intentions and to his scientific and critical metaphysics, and thus has something to recommend itself. The question is whether the modal principle is the proper schema to be applied.¹⁶ Merely combinatorially it is unlikely to succeed: Peirce's division of sign classes is of ever increasing complexity, where modalities turn up selectively and only in some well-justified nooks and corners of the overall theory. It is hard to conclude, for example, from the presumption that qualisigns are logical possibilities, sinsigns actualities and legisigns logical necessities, together with the modal subsumption between them, that all trichotomies, even those that the future will bring, were to be so partitioned. Peirce's late classifications are not neat: they produce a soup of wicked characteristics and complex dependencies between numerous regenerative classes. When Peirce mentions the famous "mixed signs", and even when they merely are cooked from simpleton icons, indices and symbols, they are just that: concentrations of mixed solutions and decompositions with surprising and unexpected results. The glue of nested modals does not stick well between meanings and beings. General, singular and indefinite are all relations of signs to their immediate objects, that is, they are types of propositions, and of them only. Generality and necessity do not blend here, either; nor do they in the aforementioned trichotomy of signs classified "in themselves", namely the tones/qualisigns, tokens/sinsigns and types/legisigns. Likewise, an indefinite sign (a "vagosign" in 1905) and possibility find no easy match. And in principle one needs only one counter-example against the subsumption schema.

In Peirce's theory, the sign classes are derived from complex relationships and interactions between divisions of signs that are made according to those relationships that signs bear to themselves, to their immediate and dynamic objects, to the nature of those objects, to the modes of representing them, plus similar complex relationships regarding their immediate, dynamic and final/ultimate/eventual/representative interpretants, as well as their nature, cause, connection, and form, and modes of

¹⁶ Champagne and Chevalier talk about three modalities, but actuality is not a modality, and contingency is definable as a possibility that is not necessary. In view of this, actualities do not match contingencies.

representing those interpretants. **Charles Peirce's** "Division of signs" provides a snippet of these murky divisions. They generate a really complicated network of relationships from which a huge panorama of sign classes is open to view. A universe that would generate all that from the basic modal schema would be one miraculously 'fine-tuned' to such signs.

From Peirce's refusal to talk metaphysics or epistemology when it comes to the investigation of notions of being one can make a safe traversal to an exposition of mental structures that could match propositional and logical content. Despite having been presented two decades ago, **Nathan Houser's** paper "Being in the world" has not lost its edge on what the best way to understand the structure of cognition and its workings is: namely the "moving pictures of thought", that is, the logical method of existential graphs (Pietarinen 2006a; Stjernfelt 2007). His exposition of that method, just as Roberts's (1973), is accurate and faithful to Peirce's own concepts, resisting fitting the method either to the Procrustean bed of formal theories of logic that spawned from the Frege–Russell tradition, or the "visual turn" that the advocates of diagrammatic logics have uncritically sported (Bellucci, Pietarinen in press b). The value of Houser's paper also draws from the fact that its thesis sustains logical notations' autonomous roles different from the one they were thought to have in connection to what in cognitive sciences has become an industry of mental, conceptual and cognitive models and spaces, the extended-minds, and so forth.

When Heidegger wrote in his youthful work quoted by Houser that "being lies in the fact that something is, and in its Being as it is; in Reality; in presence-at-hand; in subsistence; in validity; in *Dasein*; in the 'there is'", such sentiments only serve to testify to those hideous battles he had to weigh in striving to conquest the meaning of being – which in the end he of course neither did nor could do, only to be sucked ever deeper into the dark waters of fascist poetry. Now the true poetry is found in existential graphs. All these meanings of *being* are captured by the line of identity: the continuous line represents the existence of a fact (= the line, as a graph-replica, scribed on the sheet of assertion); being as it is (= being *qua* being: a self-returning line expressing being identical to itself, that is, well-definedness); reality (= how the line is "connected with nature", that is, its interpretation in the universe of discourse); presence-at-hand (= observation of the line scribed on the sheet by the Graphist and Graphus in their field of common experience); subsistence (= class-inclusion); validity (= the line scribed on the sheet of assertion as true in all interpretations); the 'there is' (= existential quantification); and *Dasein* (= no comment here...). Now what can be more beautiful than the poetry of graphs?

We do not speak the language of Graphish but does it matter? The elusive nature of skeleton-sets that **Benoit Gaultier** examines in "Some perplexities about Peirce's 'skeleton ideas'" also concern the question of the basic forms or constituents of our cognition. For Peirce, these skeletons were at one time the bare building blocks or

simple representations of what is essential to relations, and by which important other feats of signification such as association or composition of concepts could be accomplished. One's attention in unravelling Peirce's puzzling proposal is drawn to the fact that his remarks on skeleton-sets cover a brief and fairly intermittent episode in his work-life: a period in 1893 when he was struggling to free himself from the demons of the past and moving on to a fresh start in logical investigations following the awkward cosmogonical excursus. The fresh start meant the production of the *Grand Logic*. The house-on-fire example from the *Short Logic* also comes from the same period. I believe his 1893 remarks on the skeleton ideas have to be interpreted against the related developments and the experiments he conducted on various logical notations given his newfangled logical work, and thus cannot be fully understood apart from what those developments were soon to achieve.

The explanation I would offer is that by the time Peirce made his remarks on skeleton-sets his concept of *rhemas*, as indeed the trichotomy of rhemas-propositions-arguments, was not yet quite clear from mist. As soon as they were, and certainly by 1903, skeleton-set ideas were perfectly captured by the rhemata. There is a gradual discovery of the logical form of the rhemata as consisting of valencies, hooks on their peripheries, and the lines connecting to the hooks, since about 1894 (MS 533; Bellucci, Pietarinen in press c). It is therefore understandable that the skeleton-sets alone do not explain, as Gaultier rightly remarks, why some *particular* ideas come to be associated in the mind with some other particular ideas, and why they explain only the *possibility* of coming to be so associated. Rhemata are incomplete signs that represent immediate objects as possible, but they do not represent them as existent or as law-like objects. They nevertheless carry out this representational task as they do have a form, which is a blank form of propositions. Rhemata do not exist unless the blanks are filled with names of definitely recognized individuals. As representations of possibilities, these unsaturated and skeletonized relational terms call up positive and distinct images in the mind, which explains much of the required associative character they have when those images are contemplated in the imagination. Peirce later explains the connection between rhemata and minds by remarking that "the *rhemata* call up images, which in the proposition are represented to be applicable to the objects of the names" (MS 516, 1902). Gaultier observes that the skeleton-sets indicate "both the structure of our thoughts and their content". The later development of rhemas makes this confounded statement that Peirce seems to have been guilty of more precise: rhemata indicate how the content is structured, which in turn is expressed in their valencies. As spots, that is, as what the indecomposable elements of thought become in the logic of graphs, they logically analyse that structure.

In his later works Peirce focuses on the compositional issues concerning the basic elements of logical graphs, and there the correlated mental task becomes the issue concerning the composition of concepts rather than the associativity of ideas. The

question is made more precise as soon as he has the necessary logical tools at hand to discourse upon the problems of composition of concepts and the indecomposability of those basic elements of thought.¹⁷ The indecomposable elements of thought are what in the spots in the graphs correspond to in connection to cognition; they are, like rhemas, indefinite elements of the propositional meaning category and thus without definite boundaries. Graphically this means that that the hooks on their peripheries are not connected with dots or lines of identities. This also explains why skeletons, just as rhemas and spots, can be made of dots and lines that denote the hooks and valencies, although they are not made of dots *as* lines of identities in the sense of dots and lines making predications by filling in those blanks by names. Being indefinite in meaning, rhemata and spots have no definite boundaries as far as their signification is concerned. Existential graphs thus work out a solution to what in his confusing transitory period was perceived as the problem of the associativity of vague ideas and confusingly explained in terms of skeleton-sets.¹⁸ Likewise, the argument for the indecomposable elements of the phaneron adds more grist to his mill in support of the negative part of the irreducibility of triads. Above all, his earlier ideas about skeleton sets became more definite and meaningful as soon as he managed to devise such a system of expression that he thought “to express any proposition whatever without being embarrassed by its complexity, which shall be absolutely free from ambiguity, perfectly regular in its syntax, free from all disturbing suggestions, and come as near to a clear skeleton diagram of that element of the fact which is pertinent to the reasoning as possible” (MS S 27, 1903, Draft of the 2nd Lowell Lecture) – namely the theory of existential graphs.¹⁹

¹⁷ “[T]he ways in which Terms and Arguments can be compounded cannot differ greatly from the ways in which Propositions can be compounded. A mystery, or paradox, has always overhung the question of the Composition of Concepts. Namely, if two concepts, A and B, are to be compounded, their composition would seem to be necessarily a third ingredient, Concept C, and the same difficulty will arise as to the Composition of A and C. But the Method of Existential Graphs solves this riddle instantly by showing that as far as propositions go, and it must evidently be the same with Terms and Arguments, there is but one general way in which their Composition can possibly take place; namely each component must be indeterminate in some respect or another; and in their composition each determines the other. On the recto this is obvious: ‘Some man is rich’ is composed of ‘Something is a man’ and ‘something is rich’, and the two somethings merely explain each other’s vagueness in a measure” (MS 292; cf. Pietarinen 2005b on how to resolve the problem of composition of concepts in existential graphs).

¹⁸ “[T]he Diagrammatization of Existential Graphs shows beyond all doubt to the discerning mind that the Composition of Concepts can only take place by the reciprocal precisions of indefinitenesses” (MS 499(s), “Z” Monist Scheme).

¹⁹ To bridge my point concerning skeleton-sets as rhemas to the previous two papers on emotional interpretants and to ethical and normative inquiry, one could recall that Peirce’s theory of meaning categories takes “esthetic goodness” to be possessed by any kind of representamen, be it a rhema, a proposition or an argument, while “moral goodness [...] may

Peirce thus took it that indefinite propositions, such as rhemata, spots and skeletonized diagrams, call up some vague images in the mind. Are mental images then best understood and analysed as a sign-theoretic phenomenon? This intriguing hypothesis is one of those fruits Peirce's theory of signs bears that still awaits to be cashed in. Jelena Issajeva's sign-theoretic approach to mental imagery in "Sign theory at work: The mental-imagery debate revisited" is a contribution to that debate, arguing that the properties and relations in the images make them amenable to a sign-theoretic analysis and even to the methods of experimental semiotics. Issajeva wishes to replace the traditional representational accounts that take imagery as a specific internal representation, either quasi-pictorial or propositional/verbal, with the functional and systemic approach inspired by Peirce's theory. Overcoming the oversimplifying pictorial/linguistic, symbolic/connectionist, or symbolic/iconic barriers is to be saluted. But are Peirce's signs systems? Are they functional? Are they non-representational? Some papers earlier in the issue, especially those by Pape and Gustafsson, argue for semiosis as primarily a processual phenomenon. Pape further argues that objects are constructed out of the functional roles in systems of signs. Maybe the open-systems methodology and the dynamic character of such systems can do the trick of conceiving of signs as systems (Pietarinen 2004b), as it would be quite non-Peircean to think of signs in any structuralist sense as forming closed systems with a network of inexhaustibly interconnected signifiers. Cognitive architectures are typically structural and functional models of intelligent processes of mental imagination, and a Peircean one is distinguished from those in capturing the open, continuous, adaptive and de-centralized phenomena that natural and evolutionary theories predict it to have.

Second, problems arise when taking mental properties to concern the essential characters of mental imagery as *functional* properties defined by their *causal role* or power in the system. Does functionalism capture the mentality in the sense of sensory qualities and qualia, such as sensations, feelings and appearances? Here Peirce's qualisigns are helpful in clarifying these issues. Still, an important question remains: what is a functional property, and where is it realized? Does a pan-semiotic predicament inevitably follow from functionalism, and would such a dire consequence defeat the proposal analogously to what happened to computationalism?

Third, I do not think enriching the imagery debate with a semiotic methodology is to give up the representational "paradigm". Even the "first firstnesses", namely images, do represent, as they are rhemata or spots in Peirce's theory of signs and logic. The motivation of why to give it up is not obvious. *Signs are representations*. As signs are

be possessed by a proposition or by an argument, but cannot be possessed by a rhema" (CP 5.141). The imagery that the latter calls up would be too weak and unclear to be of lasting value for ethical considerations and dilemmas. Whether this proves that some remote thought-experiments (the Trolley problem, Swampman, a Brain-in-a-Vat) are of little or no interest is to be investigated elsewhere.

contextual and give rise to their interpretations in connection to interpreting minds, there is no homunculus-induced regression to be feared of. The usual suspects in the anti-representational camp simply-mindedly take representations somehow to mirror the reality, just to attack the straw man. In doing so they fail to appreciate the richness that sign-theoretic representations have in their possession. Maybe the dynamical, coupled-system and EEEE-related²⁰ mental states, subject to co-evolutionary forces and laws of natural selection, are incorrectly tagged as anti-representational in the literature. However, it may be helpful to take representational states in the wider sense of the triadic structure of signs. In this and also some other senses that we have no space to discuss here, Houser's argument that favours existential graphs as the model of cognition as well as Issajeva's paper both propose some novel and under-explored directions to the fields of cognitive sciences and cognitive semiotics. I have proposed (see Pietarinen 2011b) that spots or rhemata in existential graphs are images, or the "first firstnesses" of hypoicons, alongside with diagrams and metaphors. Houser proposes that spots correspond to percepts, thus linking perception, thought and propositional content by the manner spots operate in the theory of existential graphs.²¹ Issajeva takes images to be rhemata. My goal was to argue that non-logical alphabet in the logic of graphs has a natural interpretation that assigns logical status to images. The three are not that different. Maybe we can agree with Peirce that "the *rhemata* simply call up images" (MS 516). At any event, if mental imagery has that nature of signs (and we would do well not to confuse images or imagery with *visual* images or pictures), there is a logical theory readily at hand for analysing mental imagery, yet antedating the recent labours by nearly a century. Indices link graph-instances with nature or with the universe of discourse and thus with the bodies, their surroundings and the world. The graphs model embodiment of cognition with the aid of indices. Since they are models, we can study and experiment with them, and observe what invariants there may be when the components of graphs come to have various interpretations under various circumstances. Existential graphs confront the reality head-on, or should I say the loose ends of the lines on: once you scribe a dot, you have begun modelling not only what exists that is well-defined (in the sense of being identical to itself) but also your intellectual thought processes.

As a point of comparison, Euler diagrams, which are the topic of **Amirouche Moktefi's** "Is Euler's circle a symbol or an icon?", have no 'being in the world' since they lack such lines and therefore do not express propositions or existence of individuals.

²⁰ Embodied, embedded, enacted, extended.

²¹ What is worth noting is that percepts have their immediate objects which according to Peirce are "excessively vague" (MS 292). They are felt, but not thought of. Percepts, unlike perceptual judgments, are not propositions, but whether this serves as a counterexample to Bellucci's thesis that only propositions have immediate objects depends on how we view the encoding of graphs to cognitions, or the status of graphical assertions as models of cognition, and how that encoding preserves the propositional structure or content.

The being in the world is excommunicated by dispensing with the idea of the logical form altogether. Euler's circles famously lack expressivity, but what about their iconicity? Peirce's answer to the title question is that "circles by which Euler represents relations of terms [...] well fulfill the function of icons" (CP 3.363, 1885). This does not mean that they are not symbols. Some other features, such as the shading that Venn and Peirce came to propose (possibly independently of each other or else Peirce was suffering from cryptomnesia) is a conventional sign, that is, a symbol (Moktefi, Pietarinen 2015). What Euler diagrams lack is the ability to refer to the subjects of discourse. But how to understand iconicity in Euler diagrams? Moktefi's interest is in seeking support to the hypothesis that Euler's circles have a higher degree of iconicity than what Peirce came to attribute to them, or what usually is thought of them, even higher than what is attributed to other kinds of diagrams and notations. It is this highest kind of iconicity that explains, according to Moktefi, why Euler diagrams "work so well".

Working well depends on one's purposes: for Peirce they of course ultimately fail to serve the purposes of logic, analysis and representation, for a number of reasons.²² But let us ignore such criticism for now and investigate what a higher iconicity could mean. Moktefi suggests that the interest lies not in arguing for a higher degree in representing properties of relations but in that those signs of Euler diagrams, namely the simple closed circles representing classes, *are* the properties of relations.

There are countless properties of relations that circles and their geometrical arrangements do not capture, neither as representations nor as being those very relations, although the latter is surely a much more stringent constraint: non-primitive recursion, for example, is not geometrically or "physically" representable in any natural or informative way with such circles, and certain configurations derived from five arcs or using fifteen regions are impossible to represent on an Euclidean plane altogether (Sinden 1966). So there are fundamental limitations to what kinds of relations can be expressed using the geometric mechanism of Euler's circles. Similar limitations haunt many other kinds of logical diagrams. So it must be that any claim for a higher degree of iconicity is with respect to *some* limited set of relations and their properties. In the case of circles the transitivity of containment may present itself as a natural candidate, but that example does not generalize. How then to support the claim that Euler's circles work so well?

Ignoring the fact that the iconicity of containment does not generalize and that there are many relations and properties that are left unexpressed, what is the validity of the claim that nested circles *are* the transitivity property of the containment relation and not the *representation* of that property of the relation? If that containment relation is the fact of the world, and that fact has certain logic, there are no further

²² Among them are that the system "cannot affirm the existence of any description of an object"; their inadequacy of dealing with disjunctions in a general case; and, fatally, that the system "has no vital power of growth beyond the point to which it has been carried" (MS 491).

representatives for that fact, no logical constant or logical form to represent the fact. The forms for such logic are not self-sustaining; they *are* the forms of their objects, namely do not exist independently of those objects whose forms they are. Thus such forms do not admit of alternative interpretations. Their form is what the form of the class is. This seems unnecessarily restrictive. For example, imagine that the circles would need to be interpreted differently from the way they are interpreted when being the facts of classes standing in a containment relation to each another. Two non-overlapping circles would apparently have nothing to show about the physical or geometrical fact of containment. Yet they would carry the form of the facts from which they are indistinguishable to the situations in which they are non-overlapping. How could I then understand the difference in the relationship between non-overlapping circles and nested circles? Does an undiscovered tribe in Sumatra naturally think that the circle with a smaller radius is necessarily contained in another with a longer radius, no matter circles being nested or not? The upshot is that such re-interpretations would be impossible to achieve, since the circles, lacking the status of self-sustaining logical forms, would simply not be re-interpretable in the required manner, since the nesting is defined by necessity to be the containment relation between classes. In other words, Moktefi's idea that the circles do not represent, but are, the relation leads to universalism concerning the meaning of logical constants: their meaning is given by the very physical form, once and for all, and not by our interpretations of those forms. However, is this not then what iconicity in Peirce's sense is supposed to be all about? Not quite, since such universalism leads to semantic ineffability concerning the relations between logic and what it speaks or shows to be the case about. Semantic ineffability is the tenet that we cannot vary the meaning relations by applying logical constants or pieces of notation and signs in their contexts. Ineffability contradicts iconicity, as in existential graphs for example the signification of the line of identity depends on which context it is embedded in, that is, it depends on the nested system of cuts. Cuts, in turn, depend on the relation of illation. The relation of illation, in turn, is represented by two nested thin ovals (or "the scroll"), but its signification is not a containment between classes. If so, circles cannot be truly iconic, because being an icon presupposes the possibility of structure-preserving mappings from icons to their objects, and those mappings may have to vary from case to case (properties of mappings are defined by the specific cases of comparison). There are further properties to icons not shared by Moktefi's account of Euler's circles which we need not delve into here, but they share the idea that there is liberty in interpretational considerations for what the logical forms are and how they are connected to their models.

In other words, if the circle, as a class, carries its own logical form, how am I supposed to be able to understand what a complex system of such circles means if I only know what the classes are? I know nothing about how those circles are related to one another, since the circles are presumed to be their own logical forms. The only

determining factor one can resort to is the presence of a simple Euclidean geometry, but that is very limited expressively, prohibits real iconicity and is thus ultimately a deceptive asset. In other words, the totality of possible relations and properties of relations that one wants to capture matches the totality of the logical forms given by circles and their combinations. If all you have are Euler's circles, then everything in the world would start to look like circles. But why assume that it is the objects or classes as those objects that give or determine their logical form? If only facts and not complex logical forms can express or show the facts concerning the configuration of objects, then not only Euler's circles but all logical notations, in particular those that force some geometrical relationships between names or classes, also are such facts (and not independent logical forms) that express or show those object configurations.

Simple planar geometry does not imply higher iconicity, as the constraints are so severe. Nor is iconicity a free pass to greater expressivity, quite the contrary: taken in a concrete, physical sense it would rigidify the notation and limit the system's expressive power. Taken in Peirce's sense, it needs to be investigated, case by case, whether a proposed iconic representation implies something good as to the analyticity or expressivity or some other virtues of one's logical language.

Moktefi writes that linear diagrams "proceed *exactly* as Euler's do". This should not be read so that the two are equivalent in their expressive power: linear diagrams fail to capture every syllogism. Same level or degree of iconicity (and these qualifications seem to me to be moot and currently ill-defined) does not imply that the same meanings or inferences get to be expressed. That the dotted lines (which need further assume to be orthogonal to the line segments, and the plane be Euclidean with the fifth postulate) "act *exactly* as Peirce's lines of identity" cannot be right, since linear diagrams have nothing to do with quantification. Estonia is a proper physical part of the map of Europe with has continuous borders, but what about Reunion or Sint Eustatius? Is yeast part of the bread? Is a sign part of the mind? Is a mind part of the brain? Inclusion exclusively defined by physical or geometrical constraints quickly leads to troubles even in basic mereology.

The containment in mereology is commonly understood as part of the definition of parthood as a partial ordering: Any part of any part of a thing is itself part of that thing, they say. This is an interesting application of the *nota notae* principle. What the claimed free ride of the transitivity in nested circles has been in the literature, is really an instance of the *nota notae*. But is transitivity of containment universal even in mereology? Is Messi's left foot part of the *Blaugrana*?

Even if we could reply to these charges by changing the definition of what the basic properties of mereology are to exclude things such as being "distinguished" or "functional" parts of the whole, I cannot express in the formal system of Euler graphs the basic fact that if A is contained in B, and B is contained in C, then A is contained in C, because expressing this fact I would need three variables and three two-place relations,

while Euler graphs can express only monadic predicates. We can express transitivity in constraint diagrams, but that is already a different ballpark. Would constraint diagrams thus be even higher in iconicity than Euler's diagrams? Or is iconicity simply an illicit term to describe what a concrete, physical resemblance between a piece of notation (circles) and the classes they are the facts of aims to capture? Moktefi appeals to a "mental process" that Peirce alludes to in forming such relations in imagination, which indeed is the gateway to what icons in Peirce's theory are, but from this he concludes that it is the physical resemblance that gives rise to the true iconic form by "imitating" those imaginary relations. Furthermore, a dot and a dot that extends to the line or arbitrary length and shape are one and the same sign representing the *being* (in the case of Moktefi's example, identity). There is no difference in iconicity, let alone in the degree of iconicity, in representing the beings of individuals and their identities in existential graphs. No verbal description distinguishes Figures 7a and 7b (in Moktefi 2015) from each other. To claim that Euler diagrams possesses this, or "even higher degree of iconicity", is to make a comparison between apples and oranges: Euler diagrams do not represent individuals, or their existence, or identities. Another difference that makes the notations in these two theories incomparable even in the general case is that existential graphs are not planar, although their projections may look like so to the naked eye, since whenever the system uses lines of identity (Beta), the third dimension is inevitable to prevent lines crossing each other becoming joined.

Although Euler diagrams are in their expressive power a fragment of existential graphs, for those who tend to take understanding Euler diagrams easy and to be based on some concrete, visual or physical features it may serve as a useful reminder that the general theory of Euler diagrams is as hard as second-order arithmetic (Schaefer, Štefankovič 2004). So what are the limits of Euler diagrams, or those of my language? Under the Tractarian conception, are they diagrams that only I understand, or the only diagrams that I understand?

* * *

In closing, it is worth quoting Peirce's unpublished summary of some of the basic notions involved in the previous remarks in length:²³

There are three kinds of representamens, or signs: *icons*, or images; *indices*; and *symbols*, or general signs. An icon is a sign by virtue of resembling its object, which may not even exist; as for example, a statue of a centaur is an image. But

²³ From MS 492, Logical Tracts II, 1903. In these passages Peirce summarizes the key points of what he made in the mostly lost parts of the first part of this text, the Logical Tracts I (MS 491).

strictly speaking, the image is in consciousness. The outward statue is an image only in the sense that it excites an image in consciousness. An index represents its object by virtue of being connected with it in fact, and is necessarily an existing thing or fact. A photograph is an index. For, although it calls up an image, yet it conveys positive information about its object only because we know that physical forces have compelled it to be a faithful likeness. This actual fact imparts to the photograph a representative efficiency, whether the person who looks at it is aware of the fact or not. A *symbol* is a representamen whose representative virtue lies in its being interpreted as having such value. This, for example, is the character of language. Something is whispered in the ear of a king. The result may be that thousands of men lose their lives, that thousands are born who would not otherwise have been born, and that the moral character of a nation is modified. This is not sufficiently accounted for by the fact that the whisper excited an image in the mind of the king, or that the acoustic vibrations were physically connected with any facts; nor even by any force being put upon the king's subjects to do as they did. Unless you hypnotize a man you can hardly put any force upon him of any considerable amount. When we speak of compelling a man to do something, what we mean is that we cause considerations in regard to the future to influence him so as to induce him to act in a given way. The representative force of language and of every other symbol depends upon the symbol's being made such as it is for the sake of the future. This influence of the future is what we call *reason*. It is futile to endeavor to show that it can result in any way from any combination of *imaging* (which is only the vestige of the past) and of *force* (which can only be exerted by what is here and now). The influence of the future must evidently be a third element. It cannot actually be in consciousness, although we can have an indication of it in consciousness as we can on paper. It is strictly a habit governing thought; and as the representative force of the symbol is of this nature, the mode of being of the symbol is of the same nature. Thus, the word 'man' may occur hundreds of times in a book, and of this book there may be myriads of copies. Yet every one of these millions of imprints are one and the same word. The word consists in the habit of thinking about a succession of three characters, **m a n**, in a certain way. It is the same with any symbol. Each mass of ink spread upon paper in a shape sufficiently like man to be recognized for that, may be called a *replica* of the symbol. All symbols that are created now-a-days, – and I doubt not it was so from the very first, – have forms derived more or less according to general habits and dispositions of symbolizing. But in case the meaning of a symbol is mainly arbitrary the replica in which we first meet with it, which may be called its *introductory* replica for us, will be very indefinite, as above remarked.

All representamens are either *sisigns* (*semel signa*), *bisigns*, or *tersigns*, according as they are once signs, doubly signs, or triply signs. An icon can only be a *sisign*: a symbol alone can be a *tersign*. The *tersign* appeals to the reason of the interpreter to accept it, and does not concern us here. A photograph is an example of a *bisign*. For on the one hand the manner in which it has been produced necessitate its fidelity to nature, while on the other hand, it presents an image of that nature. It thus affords information; and this is the distinguishing characteristic of the typical *bisign*. But the symbolic *bisign* is markedly different

from the indexical bisign. The latter represents the state of things at the moment. It is true that the light may be years in coming from the star photographed to the photographic plate; nor is the action on the plate instantaneous. But as to the former objection, it is the incident rays that constitute the object photographed; and as to the latter objection, it misses the point which is that the index represents the facts at the very time when the action takes place, which time no doubt is always a variable of an integral of action. But a symbolic bisign never primarily represents the present time but always future time. It always assumes that the truth, the very truth is destined to be discovered. It does not assert this. Far from that, its utterer probably believes no such thing. But he goes on that supposition in so far as this utterance does; and what he asserts, – subject to that condition, – is that something will be discovered. The proposition represents a fact, which is, as it were, a rag torn out of reality. But the proposition need not be understood as asserting that the reality is a patch-work of facts. But in the process of discovery knowledge comes in bits, and it is such an item of discovery that the proposition represents. Accordingly, the proposition can only express itself by analysis of the fact; yet it by no means represents that the fact represented is in itself so analyzed.

Much in the spirit and letter to what we find in the introduction to his 1885 “On the algebra of logic: A contribution to the philosophy of notation”, in which the triad of icons, indices and tokens (= symbols) is set out to aid the development of a perfect (= maximally analytic) system of logical notation springing from algebraic considerations, these 1903 sketches of sign trichotomies are promissory notes followed by an array of definitions that appeal to graphical logical notations. Classifications of signs may be useful in setting the ground and making the erection of optimal theories of reasoning and discovery possible. Peirce thought that any perfect system of logic needs to exemplify these basic trichotomies. In more than one senses, then, his theory of signs is a prelude to his work on logical notation and to his philosophy of pragmatism rather than a finished theoretical product with autonomous interest; an overture that feeds some basic assumptions and conceptualizations concerning signs to theories of logic and pragmatism, and thus in itself remains, understandably and unsurprisingly, an unfinished venture.²⁴

²⁴ Research supported by the Estonian Research Council (projects *Diagrammatic Mind: Logical and Cognitive Aspects of Iconicity*, PUT267, 2013–2015; *Abduction in the Age of Fundamental Uncertainty*, PUT1305, 2016–2018). I thank Kalevi Kull and Francesco Bellucci for comments and suggestions. Finally, one tidbit which may not be known but which concretely links Peirce to the University of Tartu in which *Σημειωτική* has been edited for over half a century: Julius (Theodor) Isaac Faerber, who worked at Tartu as a lecturer in English in 1886–1892 (then the University of Dorpat), was Peirce’s student at Johns Hopkins University. Faerber, a graduate student in mathematics at the JHU, attended two of Peirce’s classes in the academic year 1883–1884: on the fall semester he took “The Psychology of Great Men” and on the spring semester “Probabilities”. I dedicate this post-centennial issue to the memory of my teacher, colleague and friend Jaakko Hintikka, who passed away on 12 August 2015.

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Новые исследования знаков: комментарии и перспективы

Комментируются все четырнадцать статей, которые публикуются в настоящем спецвыпуске *Sign Systems Studies*, посвященном теории знаков Ч. С. Пирса. Прежде всего делается попытка соединить некоторые центральные темы и утверждения, помещая их в более широкий контекст пирсовской логики и философии.

Uuemad märgiuringud: kommentaare ja perspektiive

Käesolevas kommentaaris vastatakse neljateistkümnele artiklile, mis on avaldatud ajakirja *Sign Systems Studies* käesolevas Peirce'i märgiteooria erinumbris. Püütakse ühendada artiklites käsitletud keskseid teemasid ja väiteid ning asetada mõned nende põhipunktid Peirce'i loogika ja filosoofia avaramasse perspektiivi.