Research Article
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Transdisciplinarity across the Qualitative and Quantitative Science through C.S. Peirce’s Semiotic Concept of habit

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Abstract: This paper investigates how Peirce manages to establish a transdisciplinary fallibilist view of the sciences that is not hostile to religious spirituality viewed as a complementary fallibilist knowledge type. I focus on Peirce’s attempt to construct an alternative to classical mechanical ontology with its reversible time concept and the ontological view of absolute transcendental laws of nature. His triadic semiotic pragmatism has empiricism in common with the logical positivists, but it shares the fallibilist critical stance with Popper, with whose critical rationalism Peirce also shares a thorough-going evolutionary approach. With Hegel and Schelling, Peirce shares a kind of evolutionary objective idealism and with Whitehead a thoroughgoing process view, and finally with Wittgenstein, he shares a pragmatic view of the meaning of words and concepts. What knits together all these apparently incompatible views is his dynamic Tychism and his Synechist field view. Together these produce a transdisciplinary irreversible view of habits as “laws” of nature, mind, and society that emerge in the development of the cosmos. Though Peirce is somehow close to Hegel’s phenomenological and dialectical view on cosmogony, a number of aspects are quite unique about his approach: the most important of these are his dynamic triadic categorically-based semiotics that makes him understand human beings as well as the universe as symbolic self-organizing developing processes. This is an interesting alternative to modern mechanical info-computationalism1.

Keywords: Peirce, habits

1 Introduction

C.S. Peirce, who died 100 years ago, was the father of an American pragmatism based on the logic of semiotic relations. To distinguish it from the more superficial American pragmatism that became dominant, he called it pragmatism. In that, he develops a relation logic acknowledging that interaction as such is not necessary for a relation; relation is something that arises from and continues after such interaction has ceased. Only an irreducibly triadic relation uniting three distinct terms constitutes a “sign” formally, is what is established by Peirce’s unique semiotic paradigm. Peirce’s basic semiotic triads are meant to refer to the main phenomenon of all kinds of semiotic reasoning (Brier, 2015a) in nature, mind, and society. Thus, the whole purpose of his semiotic machinery is to understand the essence of reasoning processes, not only as internal mental human processes, but also as chains of arguments in perception, thinking, and

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1 The present paper is an extended version of the long abstract published in the proceedings of the Convention IS4IS, Gothenburg, 2017.

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communication based on an aesthetic as well as an ethical perspective (Peirce, 1931-1958, Vol. 6, para. 25\(^2\)). The Sign in its form of an irreducible dynamic triadic process is a syllogism. One can view the major premise as the Representamen function; the minor premise as the Object relation and, finally, view the conclusion as producing the Interpretant. This is a dynamic transformative self-organizing process. It is not just like a conveyor belt in a machine or an automatic algorithm in a computer. In the Peircian sign, be it in language, paralinguistic signs, or animal communication, the information is actively interpreted from input sensation to result in social reality, which is not just “behavior” as in behaviorism, but carries meaning.

Peirce’s view of science and religion differs from the received view of both classical dualistic science and more modern physicalistic approaches, as he puts the signs at the center of his world - instead of matter as in classical physicalism, energy as in relativity theory or information as in modern info-computationalism. Though he was educated as a chemist and worked empirically as a physicist, his philosophy of science is also based on a phenomenological philosophy through which, in a variety of qualitatively mathematical analysis, he identified three irreducible elements of all kinds of experience. Peirce wrote:

All the elements of experience belong to three classes, which, since they are best defined in terms of numbers, may be termed *Kainopythagorean categories*. Namely, experience is composed of 1st, *monadic experiences*, or *simples*, being elements each of such a nature that it might without inconsistency be what it is though there were nothing else in all experience; 2nd, *dyadic experiences*, or *recurrences*, each a direct experience of an opposing pair of objects; 3rd, *triadic experiences*, or *comprehensions*, each a direct experience which connects other possible experiences.

(3. Peirce, 1931-1958, Vol. 7, para. 528\(^3\)).

The categories traverse the idea of an inner and outer world, which is typical for a phenomenological point of departure. Peirce wrote later that “three elements are active in the world, first, chance; second, law; and third, habit-taking” (Peirce, 1931-1958, Vol. 1, para. 409).

C.S. Peirce’s pragmaticist, triadic semiotic theory is the only paradigm that can match system science in transdisciplinary scope, cybernetics in process dynamics, and hermeneutics in the theory of meaning and still have a logical foundation, This is because he sees logic as semiotic (Peirce, 1931-1958, Vol. 2, para. 227-231) and envisages this with the new interactive embodied theory of mind as being embedded, embodied, enacted as well as extended. It is a phenomenologically-based, natural and social scientific, process-based vision of the mind as a complex semiotic set of activities distributed across brain, body, language, culture, and world. Semiotics (unlike mathematics) is a positive science dealing with real relations. One of the most important lessons to take from Peirce’s semiotics in the vast reorientation of the whole domain of sensation, perception, logic, reasoning, thought, language, images etc. towards the chain of reasoning as its primitive phenomenon (Stjernfelt, 2014). The point of pragmaticism is that it can be formally described, independently of the materials in which it may be implemented. This implies that propositions are not only entities of language or consciousness, nor do they presuppose any conscious “propositional stance”. They are multi-aspectual real and logic is semiotic. He wrote: “Logic, in its general sense, is, as I believe I have shown, only another name for semiotic (σημειωτική), the quasi-necessary, or formal, doctrine of signs” (Peirce, 1931-1958, Vol. 2, para. 227).

If science is a way of knowing the universe and how it works, then religion springs out of the phenomenologically-based tendency to make sense of our experiences of relationship with the universe and all the other forms of living intelligence in it. Religion springs from human beings’ religious experiences, as Peirce argues in his “Neglected argument for the Reality of God” from 1908 (Peirce 1931-1958, Vol. 6, para. 452–467; Brier, 2014a).

If our internal experiential world and the material outer world are two sides of the same coin, then the coin is us, not the universe itself, and it raises the problem of whom or what we are. Not only personal but as groups connected through a language and a culture. Humans seem divided into a rational materially optimizing *Homo economicus* and a *Homo religious* driven by a hermeneutic meaning-seeking aspect.

\(^2\) Peirce’s Collected papers (often referred to as CP) where the first number refers to volume and the next to paragraph. It is now freely available on the net https://colorysemiotica.files.wordpress.com/2014/08/peirce-collectedpapers.pdf

\(^3\)
Knowing, not at least scientific knowing, seems to be the key to connecting our two aspects. It seems that economical system thinking lacks a theoretical foundation in the phenomenological and hermeneutical aspects of communication, because it is often based on statistical concepts of information and views communication as information transfer. Thereby analysis of the aspects of signification and interpretation is left to common sense, leaving out important philosophical dimensions of worldviews, historical situation, cultural horizon, and the relation between rationality, logic, and meaning. Thus, business communication is often based primarily on the rationality executed by economic paradigms of game theory, control theory, and artificial intelligence blended with common sense practical rationality.

Our civilizations were originally organized around religious meaning. Science was something developed much later as another type of searching for the truth. From the development of the natural sciences, quantitative empirically based modeling using mathematics became the core of quantitative science from which, the mechanical physicalistic ontology of the Cosmos as something governed by absolute laws, sprang. So did the logical positivist reductionist view, which was crystallized in social science. Today, this philosophy of science seems to be a hindrance to integrating qualitative theories of quale consciousness and social theories of meaningful communication with the natural sciences. It is a problem because, ever since Darwin’s theory of evolution was accepted, we have been forced to find a way to unite evolutionary and historical sciences into our scientific - often mechanically dualist based - worldview in order to better understand ourselves and our culture’s relation to its ecological foundation.

It seems that we need to produce a non-reductionist unity of science that will integrate the quantitative and the qualitative sciences in some kind of transdisciplinary framework as exemplified by Cybersemiotics (Brier, 2008). To do that we will have to develop our ontological and epistemological view of humans and the possible function of our knowing process in the universe in a philosophy that is able to include phenomenology. It is within the experiential mind that meaning, philosophy, and religion is generated. An aspect of our body can be described by biological science in an physiological, evolutionary and ecological scientific framework; and here it already seems that we are at the limits of the mechanical philosophy of science and have to use thermodynamics to found our models and has been at odds with a purely mechanical paradigm (Prigogine, Stengers, 1984). The deep problem is whether we are related to the universe in other ways than material, energetic and informational sciences has thus far described. Peirce attempted to create an alternative semiotic process worldview. Peirce views the life of signs as a self-organizing and developing process. Like a virus, signs self-organize and reproduce through their tokens, without signs being themselves fully embodied living creatures. Yet, signs are embodied by humans, through our thinking and imagining. In Peirce’s triadic semiotics, symbols grow by nature and are supported by the tendency to take habits, be this in human biology, mind, or culture. This explains Peirce’s view of how the tendency to take habits, combined with symbolic dynamics, is the driving force across the realms of physics, chemistry, biology, psychology, sociology, and religion!

When Peirce was not applying the categories to the special sciences, like physics or psychology, he started to call those categories Firstness, Secondness and Thirdness. These quasi-mathematical terms fit very well into the logic of relations he developed. In the 1903 “Syllabus”, he defines them in the following way:

“Firstness is that which is such as it is positively and regardless of anything else. Secondness is that which is as it is in a second something’s being as it is, regardless of any third. Thirdness is that whose being consists in its bringing about a Secondness.”


Peirce makes mathematics and mind converge through his three-category-based semiotics, where logic is semiotic. This is a fundamentally different way of looking at logic. Semioticians doubt that reality is a deterministic algorithm playing itself out. Our progress in physics that has led to quantum mechanics and quantum field, which support the idea that it is necessary to create new non-mechanical ontologies that can encompass evolution as well as the free will of humans. One of the reasons is that quantum mechanical experiments are tied to the free will choice of a measurement, as Wheeler (1994) points out. Thus, analysis of awareness and free will seems necessary to establish a new philosophy of transdisciplinary science.
Therefore Peirce uses “categories” and “elements” in reference to his phenomenological triad. The concept of elements, he used to signify the non-decomposable parts of the phaneron. His use of the term categories was not about classification of phenomena, but about analysis of the elements of which they are composed. Finding the elements that are always present in the phaneron. The phaneron being that, which is everything one can think.

This makes it possible for Peirce to do what the logical positivists were not able to do: namely, to produce a philosophical framework for uniting the natural, human, and social sciences and to stop the war over which type of science is most true and useful. This can only be done by changing some basic ontological and epistemological viewpoints about mind, matter, law, scientific truth, evolution, and the reality of meaning.

Before we enter into a discussion of his central concept of habit, let us take a look at how Peirce views the connections between mind and matter: “(W)hat we call matter is not completely dead, but is merely mind hidebound with habits. It still retains the element of diversification; and in that diversification there is life” (Peirce, 1931-1958, Vol. 6, para. 158). Thus, Peirce did not support the idea of classic natural science that the world is built from elementary particles only, governed by universal laws driven by purely material forces and energy. He called his alternative view synechism, which (coming from the Greek synechés meaning “continuous”, cf. 1931-1958, Vol. 7, para. 565) is “that tendency of philosophical thought which insists upon the idea of continuity as of prime importance in philosophy and, in particular, upon the necessity of hypotheses involving true continuity” (Peirce, 1931-1958, Vol. 6, para. 169). The consequence of this view is a rejection of ultimate elements, or the view of atoms as “Das Ding an sich”, ultimate things (without an interior science can access). Peirce has always – in spite of his great admiration for Kant and his work - objected to this idea of ‘the thing in itself’ as it poses an unacceptable postulate of an ultimate limit of knowledge using the inexplicable as an explanation. Peirce wrote:

“Synechism is not an ultimate and absolute metaphysical doctrine; it is a regulative principle of logic, prescribing what sort of hypothesis is fit to be entertained and examined. The synechist, for example, would never be satisfied with the hypothesis that matter is composed of atoms, all spherical and exactly alike. If this is the only hypothesis that the mathematicians are as yet in condition to handle, it may be supposed that it may have features of resemblance with the truth. But neither the eternity of the atoms nor their precise resemblance is, in the synechist’s view, an element of the hypothesis that is even admissible hypothetically. [...] So the synechist will not believe that some things are conscious and some unconscious, unless by consciousness be meant a certain grade of feeling. He will rather ask what are the circumstances which raise this grade; nor will he consider that a chemical formula for protoplasm would be a sufficient answer. In short, synechism amounts to the principle that inexplicabilities are not to be considered as possible explanations; that whatever is supposed to be ultimate is supposed to be inexplicable; that continuity is the absence of ultimate parts in that which is divisible; and that the form under which alone anything can be understood is the form of generality ”, which is the same thing as continuity.”


Peirce did not believe in ultimate limits of knowledge. One can also call his view a special kind of holism insisting that the whole is always more than the sum of the parts. He explained the consequences of his synechist view on the continuum this way:

“A true continuum is something whose possibilities of determination no multitude of individuals can exhaust. Thus, no collection of points placed upon a truly continuous line can fill the line so as to leave no room for others, although that collection had a point for every value towards which numbers, endlessly continued into the decimal places, could approximate;”


Thus, synechism views the universe as a continuous whole consisting of all its parts! It is a holism, meaning that explanations by way of ultimate structures is not possible as synechism is “the doctrine that all that exists is continuous” (Peirce, 1931-1958, Vol. 1, para. 172).

This means that synechism accords with the view that continuity of being is a condition for communication (Peirce, 1931-1958, Vol. 7, para. 572); Peirce underlines that continuity, according to his
view, means that all phenomena are of one character, consisting of a mixture of freedom and constraint. Thus, Kant’s idea of Nature as being determinist, ruled by law and freedom, as only belonging to humans, is a hidden way of repeating Descartes’ dualism. Thus, meaning and reason is not only being for humans or to the living being but to all of existence, because of the deep, partly phenomenologically-based process philosophy on which his cosmogony is based; the consequence of which is that the universe, in a teleological manner, tends to increase reasonableness through its development (Peirce, 1931-1958, Vol. 7, para. 570; Brier, 2015a).

This view is foundational in Peirce’s philosophy and intrinsically connected to his concept of habit, which is again explicable from a synthesis of pragmaticism and his process philosophy’s other foundational concept, namely tychism. Tychism is another break with the classical mechanical concept of the universe - although much closer to modern quantum field theory - as it is the belief that spontaneous chance events are real events at the most fundamental levels of physical reality. By making chance part of his philosophical framework, Peirce makes possible a unity between the quantitative and qualitative sciences.

Synechism also has interesting philosophy of science consequences as it leads Peirce to embrace the fallibilist view that the results of science are continually subject to revision. Thus, like Karl Popper, Peirce was a fallibilist opposing the logical positivistic epistemology of verificationism with regard to scientific theories and models. No absolute atoms – understood as indivisible things in themselves - and laws are to be found, and the end of research for a certified truth is an ideal that is far away in the future.

Another controversial viewpoint of Peirce’s in respect of the objective stance associated with the verificationalism of the logical positivistic view of science is that, as a consequence of synechism’s fallibilism, there exists no ultimate boundary between science and religion (understood as spirituality). This view opens up a way to integrate the existential, ethical, and aesthetical aspects of knowledge with the scientific ones and, in Peirce’s metaphysics, the normative sciences, such as ethic, aesthetics and logic, play an important role. He viewed logic as an investigation of the role of good and consistent reasoning.

The problem of the role of values in the scientific search for truth is one that not only exists between science and religion, but which is already immanent in the schism between the natural and the social and cultural sciences. Peirce simply wrote that synechism is “a purely scientific philosophy [that] may play a part in the onement of religion and science” (Peirce, 1931-1958, Vol. 7, para. 578). Furthermore, as mentioned earlier, Peirce was not a proponent of physicalistic material mechanicism, but a process philosopher and an evolutionary synechist closer to a position of objective idealism. This makes his approach similar to Emerson and the transcendentalists, with whom his family were acquainted – as well as to Hegel and Schelling, as earlier mentioned.

Peirce’s evolutionary and synechist process view made him focus on vague beginnings for many phenomena in the world instead of absolute laws and indivisible atoms. He wrote:

There is a famous saying of Parmenides, [. . .] ‘being is, and not-being is nothing.’ This sounds plausible, yet synechism flatly denies it, declaring that being is a matter of more or less, so as to merge insensibly into nothing (Peirce, 1931-1958, Vol. 7, para. 569).

This strongly suggests that he thought that mind and matter are connected in a continuum and that matter therefore had some internal living qualities, because he did not believe that the world consisted in inert matter ruled by absolute and precisely determinable laws; nor did he support the idea that such laws and matter could somehow pre-exist the manifest universe in time and space came. Like modern quantum field physics’ positing of a vacuum field, Peirce’s scientific philosophy of science led him to an emptiness ontology:

I may mention that my chief avocation in the last ten years has been to develop my cosmology. This theory is that the evolution of the world is hyperbolic, that is, proceeds from one state of things in the infinite past, to a different state of things in the infinite future. The state of things in the infinite past is a chaotic emptiness, tohu bohu, the nothingness of which consists in the total absence of regularity. [...] I believe the law of habit to be purely psychical. But then I suppose matter is merely mind deadened by the development of habit. While every physical process can be reversed without violation of the law of mechanics, the law of habit forbids such reversal.

(Brier 2014b; Peirce, 1931-1958, Vol. 8, para. 317-318).
Thus, his ontology did not need to be built from atoms, energy, and bits only.

A further problem with the mechanicism of classical physics was that the concept of time in Newton’s theory of motion was reversible. Time had no arrow. By contrast, in Peirce’s cosmogony change is fundamental in that Firstness is imbued with the tendency to take habits: consequently, time has an arrow and is irreversible, which is why laws became manifest as the universe developed. This was unthinkable from a mechanical point of view and is probably one of the reasons why Peirce was not really acknowledged in classical science. However, Prigogine and Stengers (1984) in their development of non-equilibrium thermodynamics based on Boltzmann’s probability interpretation of thermodynamics, managed to get irreversibility accepted as the basic process in physical ontology in the shift from mechanicism to an evolutionary view based on thermodynamics. Nevertheless, it was very difficult for classically trained physicists to embrace. But then, in 2013, the recognized physicist Lee Smolin published the book Time Reborn (2013), in which he accepted Peirce’s as well as Prigogine’s views on the nature of time, change, and law and embraced the big change with regard to the foundational conception of physics that this view brings. Peirce had concluded that: “Hence...the laws of the universe have been formed under a universal tendency of all things toward generalization and habit-taking.” (Peirce, 1931-1958, Vol. 7, para. 515). He also wrote that “A law is in itself nothing but a general formula or symbol” (Peirce, 1931-1958, Vol. 5, para. 107). But of course, in contrast to Smolin and Prigogine, as well as to cybernetics and systems theory, Peirce also grounds his philosophical framework in phenomenology: “Normative science rests largely on phenomenology and on mathematics; Metaphysics on phenomenology and on normative science.” (Peirce, 1931-1958, Vol. 1, para. 186). A further development of his thought on the difference between empiricism and phenomenology can be found in an undated manuscript included in the Collected Papers:

Logic is a branch of philosophy. That is to say it is an experiential, or positive science, but a science which rests on no special observations made by special observational means, but on phenomena which lie open to the observation of every man, every day and hour. There are two main branches of philosophy, Logic, or the philosophy of thought, and Metaphysics, or the philosophy of being. Still more general than these is High Philosophy which brings to light certain truths applicable alike to logic and to metaphysics. It is with this high philosophy that we have at first to deal. What is the experience upon which high philosophy is based? For any one of the special sciences, experience is that which the observational art of that science directly reveals. This is connected with and assimilated to knowledge already in our possession and otherwise derived, and thereby receives an interpretation, or theory. But in philosophy there is no special observational art and there is no knowledge antecedently acquired in the light of which experience is to be interpreted. The interpretation itself is experience. Even logic, however, the higher of the two main branches of philosophy, draws a distinction between truth and falsehood. But in high philosophy, experience is the entire cognitive result of living, and illusion is, for its purposes, just as much experience as is real perception [...] it is to be remarked that I use the word “experience” in a much broader sense than it carries in the special sciences..


Thus, Peirce makes phenomenology – as it is called in Europe - one of the primary sources of philosophy. Though Peirce was inspired by German idealism and Naturphilosophie, especially Hegel and Schelling, he also has affinities with empiricism as he worked with physical measurements. This makes him a kind of process objective idealist, albeit a very special one. In the tradition of Aristotle, Hegel, and Kant, he worked out a system of basic categories that had a deep impact on his cosmogony (Brier 2014b). There are many statements in which Peirce tries to explain these basic categories. They are his development of the categories that Aristotle, Kant, and Hegel worked with in their philosophies. Here is one of his descriptions:

Actuality is something brute. There is no reason in it. I instance putting your shoulder against a door and trying to force it open against an unseen, silent, and unknown resistance. We have a two-sided consciousness of effort and resistance, which seems to me to come tolerably near to a pure sense of actuality. On the whole, I think we have here a mode of being of one thing which consists in how a second object is. I call that Secondness. Besides this, there are two modes of being that I call Firstness and Thirdness. Firstness is the mode of being which consists in its subject’s being positively such as it is regardless of aught else. That can only be a possibility. For as long as things do not act upon one another there is no sense or meaning in saying that they have any being, unless it be that they are such in themselves that they may perhaps come into relation with others. The mode of being a redness, before anything in the universe was yet red, was nevertheless a positive qualitative possibility. And redness in itself, even if it be embodied, is something positive and sui generis. That
I call Firstness. [...] Now for Thirdness. Five minutes of our waking life will hardly pass without our making some kind of prediction; and in the majority of cases these predictions are fulfilled in the event. Yet a prediction is essentially of a general nature, and cannot ever be completely fulfilled. To say that a prediction has a decided tendency to be fulfilled, is to say that the future events are in a measure really governed by a law.


These are the three necessary categories Peirce derives from his qualitative mathematical analysis of the phaneron in the sense of what is common to all human immediate and conscious experience. These basic categories of perception, thinking, and communication are at the basis of his philosophy and its development into a pragmatist semiotics. Compared to his predecessors he manages to boil matters down so that only three categories are necessary for developing all possible dynamic forms by combination. In that respect he is close to Hegel’s dialectical developmental building on thesis, antithesis, and synthesis, which was further developed in dialectical materialism’s ideas of evolution in nature, human culture, and power-distribution in society. However, Peirce has another philosophical foundation and his connection with empirical modern science was advantaged compared to Hegel and his connections to the phenomenological and hermeneutical aspect of communication as well as in comparison to dialectical materialism. It is from this phenomenological tri-categorical, synecist and tychist foundation that Peirce builds his process view of the triadic sign function, which he calls semiosis, across nature and culture. Here is one of his many definitions that underline his views on the way signs have a real dimension as part of the reality in which we live and breathe and search for the truth:

A sign is connected with the ‘Truth,’ i.e. the entire Universe of being, or, as some say, the Absolute, in three distinct ways.

In the first place, a sign is not a real thing. It is of such a nature as to exist in replicas. Look down a printed page, and every the you see is the same word, every e the same letter. A real thing does not so exist in replica. The being of a sign is merely being represented. Now really being and being represented are very different. Giving to the word sign the full scope that reasonably belongs to it for logical purposes, a whole book is a sign; and a translation of it is a replica of the same sign. [...] Every sign that is sufficiently complete refers to sundry real objects. All these objects, even if we are talking of Hamlet’s madness, are parts of one and the same Universe of being, the “Truth.” But so far as the “Truth” is merely the object of a sign, it is merely the Aristotelian Matter of it that is so. In addition however to denoting objects, every sign sufficiently complete signifies characters, or qualities. We have a direct knowledge of real objects in every experiential reaction, whether of Perception or of Exertion (the one theoretical, the other practical). These are directly hic et nunc. But we extend the category, and speak of numberless real objects with which we are not in direct reaction. We have also direct knowledge of qualities in feeling, peripheral and visceral. But we extend this category to numberless characters of which we have no immediate consciousness. All these characters are elements of the “Truth.” Every sign signifies the ‘Truth.’ But it is only the Aristotelian Form of the universe that it signifies


Signs consist of an invisibly triadic form, carrying and producing processes that manifest themselves through the production of tokens. We see here Peirce’s categorical and semiotic foundation for his transdisciplinarity. Peirce considered it his primary task to develop a metaphysical and epistemological architectonics, in the framework of which his new theory of triadic categorical theory could be understood, and connected to a dynamic triadic web of semiotics. This semiotic dynamics was viewed in terms of the processes of objective mind (Raposa, 1989) with the advances over materialism to be based upon an emptiness ontology (Prigogine, Stengers, 1984). This combination of emptiness ontology and the principle of continuity (synecism) is in some respects close to Buddhism and, in other respects, to the vacuum field in modern quantum field physics (Brier, 2014a, pp. 300–324; Peirce, 1998, pp. 303–304), again bridging science and spirituality in a new philosophy (Brier, 2017b). Peirce was influenced by Aristotle’s concept of form, but his evolutionary cosmogony was inspired by a combination of Hegel’s and Schelling’s perspectives on the matter as well as by early 20th century scientific worldviews. Consequently, according to Peirce, a sign is a medium for the communication of a form or the way a habit is embodied in the constraint of an object on the interpretant in order to constrain the interpreter’s behavior as specifically as possible (Peirce, 1998, p. 544).

Through his triadic semiotics, Peirce regards the universe as an abstract symbolic process which, through a process of self-development, unfolds its laws in the manifestation of signs and habits. What may help to solve the deep problem of quantum dynamic views concerning the birth of the universe from the
vacuum field filled with potential energy and particles to a world filled with sentient beings is the semiotic
dynamics of evolution. Peirce developed a most astonishing and novel view on the dynamics of the universe
as a series of symbols, all of which works through a so-called type-token process, with signs manifesting
themselves in the form of tokens and through habits as part of a huge semiotic process of transformation.
Here the symbolic sign plays a central role in how the Cosmos arises and develops from emptiness:

A symbol is something which has the power of reproducing itself, and that essentially, since it is constituted a symbol
only by the interpretation. This interpretation involves a power of the symbol to cause a real fact; and although I desire to
avoid metaphysics, yet when a false metaphysics invades the province of logic, I am forced to say that nothing can be more
futile than to attempt to form a conception of the universe which shall overlook the power of representations to cause real
facts. What is the purpose of trying to form a conception of the universe if it is not to render things intelligible? [...] If we
are to explain the universe, we must assume that there was in the beginning a state of things in which there was nothing,
no reaction and no quality, no matter, no consciousness, no space and no time, but just nothing at all. Not determinately
nothing. For that which is determinately not A supposes the being of A in some mode. Utter indetermination. But a symbol
alone is indeterminate. Therefore, Nothing, the indeterminate of the absolute beginning, is a symbol. That is the way in
which the beginning of things can alone be understood.

(Houser, Kloesel, 1992, p. 322).

This emptiness cosmogony is something Peirce, surprisingly shares with modern physics in the sense that
the Tychistic idea of an inherent chance activity in emptiness is similar to the vacuum field, a theory to
be developed only after his death. The respect in which Peirce differs from modern physics is in how he
conceptualizes the ontological nature of what, in physics, is described as the spontaneous activity of virtual
particles. Here, Peirce’s inherent notion of chance activity in Tychism can serve to explain spontaneous
activity, whereas classical physics tends to work with a mechanical universe and therefore encounters
problems with explaining the emergence of consciousness in a mechanical - even though it is a quantum-
mechanical – world. This view has changed significantly in the last 50 years. John A. Wheeler’s “It from bit”
philosophy (Wheeler 1994) is a good, and maybe the most visionary example of this. As in Peirce’s semiotics
and as in general system theory, central to Wheeler’s perspective is a self-organizing process. Though much
cybernetics and systems theory operates with an observer, it is not an embodied and phenomenologically
grounded observer. It is here that Peirce’s triadic semiotic and pragmaticist philosophy is able to produce
an alternative model based on his concept of the symbol as a general force of habit in nature, humans, and
culture. From the passage just quoted, Peirce continues:

What logically follows? We are not to content ourselves with our instinctive sense of logicality. That is logical which comes
from the essential nature of a symbol. Now it is of the essential nature of a symbol that it determines an interpretant,
which is itself a symbol. A symbol, therefore, produces an endless series of interpretants. [...] There can, it is true, be no
positive information about what antedated the entire Universe of being; because, to begin with, there was nothing to have
information about. But the universe is intelligible; and therefore it is possible to give a general account of it and its origin.
This general account is a symbol; and from the nature of a symbol, it must begin with the formal assertion that there was
an indeterminate nothing of the nature of a symbol. [...].


This view of the dynamics of the emergence of the universe, as of the nature of the dynamics of a general
symbolic, is unique for Peirce’s semiotic pragmaticism, showing just how much it develops a new ontology
for its synecnist and fallibilist theory of science. It offers an alternative to mechanical thinking. That even
includes the quantum field version. It also differs from general system’s theory of self-organization on an
organicist basis and its theory of emergence, that is still questionable.

General system theory was originally formulated (von Bertalanffy, 1976/68) without Maturana and
Varela’s theory of autopoiesis. Luhmann only integrated this second order cybernetic theory of life later on
in his triple autopoietic system theory. It was carried out in a fashion criticized by Maturana and Varela,
because Luhmann extended their concept beyond the cybernetic biological realm in the frames of which it
was originally produced as a theory of the nature of the organization of living systems (Mingers, 1995, pp.
82-86). However, in the Peircean framework, manifestation in the form of tokens constitutes the intrinsic
nature of the symbolic function in nature as well as in culture. In Peircean semiotics, of course, symbols need to be understood as something much more general than the way they are defined in linguistics. They break out of language, so to speak, into a semiotic world where signs are as real as elementary particles. Peirce develops his theory of the drive to be represented further in the same text:

As a symbol it produced its infinite series of interpretants, which in the beginning were absolutely vague like itself. But the direct interpretant of any symbol must in the first stage of it be merely the *tabula rasa* for an interpretant. Hence the immediate interpretant of this vague Nothing was not even determinately vague, but only vaguely hovering between determinacy and vagueness; and *its* immediate interpretant was vaguely hovering between vaguely hovering between vagueness and determinacy and determinate vagueness or determinacy, and so on, *ad infinitum*. But every endless series must logically have a limit. [...] Herein is a real effect; but a symbol could not be without that power of producing a real effect. The symbol represents itself to be represented; and that representedness is real owing to its utter vagueness. For all that is represented must be thoroughly borne out. [...] And the regularity is the symbol. Reality, therefore, can only be regarded as the limit of the endless series of symbols. A symbol is essentially a purpose, that is to say, is a representation that seeks to make itself definite, or seeks to produce an interpretant more definite than itself. [...] By virtue of this, the original replica animates the Interpretant, or by the sign it contains, with the power of representing the true character of the object. That the object has at all a character can only consist in a representation that it has so, — a representation having power to live down all opposition. In these two steps, of determination and of correction, the interpretant aims at the object more than at the original replica and may be truer and fuller than the latter. The very entelechy of being lies in being representable. A sign cannot even be false without being a sign and so far as it is a sign it must be true. A symbol is an embryonic reality endowed with power of growth into the very truth, the very entelechy of reality. [...] And the first of all logical principles is that the indeterminate should determine itself as best it may. A chaos of reactions utterly without any approach to law is absolutely nothing; and therefore pure nothing was such a chaos.

(Houser, Klosel, 1992, pp. 323-234).

Thus, Peirce provides, as an alternative to the classical mechanistic model of the universe, the self-organizing dynamics of a symbol that endlessly produces its best possible representamens and by this goes even further than the systems and cybernetics evolutionary idea of self-organization through dissipative systems. It is a very anti-foundationalist view that avoids all sorts of scientism or fundamentalist religion. However, it also provides a model of how to understand the emergence of life and consciousness in what we usually consider to be a physical world of inert matter consisting of elementary particles driven by absolute laws, but which in Peirce’s pragmatistic semiotic philosophy is viewed as a symbolically self-organizing world. In this way, he manages to circumvent the mechanical view of nature that has isolated physics from the life sciences and an understanding of embodied cognition and communication. Thus, mind emerges from the self-organizing capacity of real sign dynamics and their tendency to aggregate into greater complexes. Peirce wrote:

Consider then the aggregate formed by a sign and all the signs which its occurrence carries with it. This aggregate will itself be a sign; and we may call it a *perfect sign*, in the sense that it involves the present existence of no other sign except such as are ingredients of itself. Now no perfect sign is in a statical condition: you might as well suppose a portion of matter to remain at rest during a thousandth of a second, or any other long interval of time. The only signs which are tolerably fixed are non-existent abstractions. We cannot deny that such a sign is real; only its mode of reality is not that active kind which we call existence. The existent acts, and whatsoever acts changes [...]

Every real ingredient of the perfect sign is aging, its energy of action upon the interpretant is running low, its sharp edges are wearing down, its outlines becoming more indefinite.

On the other hand, the perfect sign is perpetually being acted upon by its object, from which it is perpetually receiving the accretions of new signs, which bring it fresh energy, and also kindle energy that it already had, but which had lain dormant.

In addition, the perfect sign never ceases to undergo changes of the kind we rather drolly call *spontaneous*, that is, they happen *sua sponte* but not by its will. They are phenomena of growth.

Such perfect sign is a quasi-mind.

(Houser, Klosel, 1992, p. 545).

The formation of habit through Thirdness is considered as the basic process of our reality in nature, experience, cognition, and communication. Habit-taking is of course also basic to all kinds of magic and religious rituals, but people often forget that they themselves are bundles of habits and thus subject to progressive change too.
For Peirce, the self is a symbol that grows with our life experience. Human beings find themselves in a world perfused with habit-taking tendencies, themselves being bundles of habits because, as Peirce explained, a habit is nothing other than the following:

... a specialization, original or acquired, of the nature of a man, or an animal, or a vine, or a crystallisable chemical substance, or anything else, that he or it will behave, or always tend to behave, in a way describable in general terms upon every occasion (or on a considerable proportion of the occasions) that may present itself of a generally describable character.


As the laws are rather vague tendencies in the beginning that become more and more rigid habits as the universe unfolds, Peirce’s crucial point is that we do not have any absolute knowledge. Knowledge develops all the time - as in dialectical views, be they those held by Hegel, Marx, or Engels. This ontology creates room for life and the evolution of mind. Peirce’s vision of the universe developing from emptiness - which we have stressed is not much different from the vacuum field in modern quantum field physics, i.e. a spontaneous chaos of all possibilities (Brier, 2014a) - is part of his semiotic vision that sees matter as effete mind and the universe as a symbol in development of a grand argument (Peirce, 1998, p. 1853). As he also points out in the relevant passage, a symbol “produces an endless series of interpretants,” and reality “can only be regarded as the limit of the endless series of symbols. A symbol is essentially a purpose, that is to say, is a representation that seeks to make itself definite, or seeks to produce an interpretant more definite than itself.”

This is pretty close to general systems theory with its process ontology of the *Self-organizing Universe* (Jantsch, 1980); but it adds the dynamics of the three categories, which is again similar to Hegel’s dialectics, but developed into a semiotics. Thus, cosmogony and evolution are explained in terms of a dynamic interaction between the three categories. Neither of the categories can be reduced to the other, but cosmogonically viewed, they are derived from each other. Since Firstness is a state of absolute possibility and radical indeterminacy as close to nothingness as possible, it is an absolute permissibility with no cause outside itself. From here, Secondness emerges as one of many possibilities like difference, otherness, individuality, limit, force, and will. Thirdness is the mediating habit-taking aspect of evolution that contributes to the creation of an emergent semiotic order based on habits in matter as well as mind and culture, which is somewhat different from Hegel’s dialectical evolution of objective Mind, as well as different from the dialectical materialism of Friedrich Engels’ *Dialectics of Nature* of 1893. In contrast to Engels, Peirce’s categories also have a phenomenological aspect to them; in contrast to Hegel, Peirce introduces the category of Secondness, which creates the empirical connection to reality and as such the possibility of falsification, which was later to become so important in Karl Popper’s philosophy of science. But what is new compared to all other philosophies is his view of the universe as a developing symbol, creating new habits of meaning as well as an endless stream of interpretants that make its reasoning powers grow (Brier, 2014b) and extend into our cultures (Peirce, 1931-1958, Vol. 1, para. 615).

Thus, for Peirce, habit, mediation, and reasoning power make up the basic character of reality, proceeding from (what we call) dead nature, through living nature, mind, and culture all the way up to our cultural and religious symbols. This is where synechism has other consequences. Peirce writes:

But, further, synechism recognizes that the carnal consciousness is but a small part of the man. There is, in the second place, the social consciousness, by which a man’s spirit is embodied in others, and which continues to live and breathe and have its being very much longer than superficial observers think [...] Not is this, by any means, all. A man is capable of a spiritual consciousness, which constitutes him one of the eternal verities, which is embodied in the universe as a whole. This as an archetypal idea can never fail; and in the world to come is destined to a special spiritual embodiment.

A friend of mine, in consequence of a fever, totally lost his sense of hearing. He had been very fond of music before his calamity; and, strange to say, even afterwards would love to stand by the piano when a good performer played. So then, I said to him, after all you can hear a little. Absolutely not at all, he replied; but I can feel the music all over my body. Why, I exclaimed, how is it possible for a new sense to be developed in a few months! It is not a new sense, he answered. Now that my hearing is gone I can recognize that I always possessed this mode of consciousness, which I formerly, with
other people, mistook for hearing. In the same manner, when the carnal consciousness passes away in death, we shall at once perceive that we have had all along a lively spiritual consciousness which we have been confusing with something different.


For Peirce, there is a growth of love and reasonableness in what he calls agapism (Peirce, 1931-1958, Vol. 6, para. 205). All of this is also part of our reasoning about nature and about our life and about how they are connected and to what purpose.

Peirce’s semiotics is a general theory of all kinds of sign systems. Those systems include, as special cases, all natural languages and all versions of formal logic. The idea that logic is semiotic is essential to Peirce’s semiotic philosophy. What we usually call logic is only the limited formal side of the whole system, which is a normative science for correct thinking based on signs. This is why the nature of signs and their way to refer to and represent forms of reality are essential to fully understand logic. Evolution is a growth in reasonableness (Stjernfelt, 2014), as well as in habit and order, and therefore tends towards goodness or the sumnum bonum (Potters, 1997). Reverting to chaos and randomness cannot be a common good or something anyone would desire. Reasonableness must be viewed as progress (Peirce, 1931-35, 5.4.). Peirce’s Synechism is opposed to any kind of duality, be it between matter and mind, nature and culture, or between science and religion. Still, Peirce considers this progress in reasonableness as a metaphysical principle in the philosophy of science and knowing that he calls pragmaticism (Peirce, 1931-1958, Vol. 7, para. 578). Peirce wrote:

A widely current opinion during the last quarter of a century has been that reasonableness is not a good in itself, but only for the sake of something else. Whether it be so or not seems to be a synthetical question, not to be settled by an appeal to the principle of contradiction – as if a reason for reasonableness were absurd. Almost everybody will now agree that the ultimate good lies in the evolutionary process in some way. If so, it is not in individual reactions in their segregation, but in something general or continuous. Synechism is founded on the notion that the coalescence, the becoming continuous, the becoming governed by laws, the becoming instinct with general ideas, are but phases of one and the same process of the growth of reasonableness. This is first shown to be true with mathematical exactitude in the field of logic, and is thence inferred to hold good metaphysically. It is not opposed to pragmatism in the manner in which C.S. Peirce applied it, but includes that procedure as a step.”


For Peirce, life, mind, logic, and semiosis are different concepts based in the actions of signs. Life emerges from the dynamics of signs. Biosemiotics is fundamentally the study of symbols as living signs organizing matter, energy and information. Semiosis is thus, in Peirce, naturalized to explain mental and living processes, which are considered to be of the same nature as symbols (Romanini, 2014). Modern science has the challenge of understanding the mental world in terms of the physical world described on a material and energetic basis driven by absolute law. We now know that we have not come to the end of our knowledge of matter and energy, since we are inventing new types of both, like dark matter and energy. If we want a sort of monism – even if it is a triadic process one, we need to find a way to connect mind and matter. Info-computationalism proposes that this can be done through the concept of information. Yet, so far, no-one has found a scientific theory explaining how quale based consciousness could emerge from information (Brier, 2017a; Brier, 2015b; Searle, 1989).

One way to attempt this is through Peirce’s and Aristotle’s ontological field view, which sees matter and mind as part of a non-reducible continuity. This has the consequence of viewing matter as having an “inside” that is somehow alive as a sort of Firstness: it has a spontaneous dynamics similar to what we have found in the quantum physics idea of virtual particles spontaneously moving around in the vacuum field. This idea of an inner movement of matter as a spontaneous evolutionary drive was already part of Engels’ nature dialectics inspired by Hegel’s evolution of the spirit, but we can see a similar idea in Bertalanffy’s general system theory because of its organicist basis. Bertalanffy was educated as a biologist. An important difference between dialectical materialism and systems theory on the one hand and Peirce’s semiotic pragmatism on the other is that none of these had a foundation in phenomenology as we find it in Hegel.
and Peirce (Ransdell, 2017). Hegel is the typical example of objective idealism. Peirce usually accepts that term for his philosophy (Peirce, 1932-1958, Vol. 6, para. 25). However, it is the philosophy’s semiotic process dynamics and pragmaticism that make it stand apart from all the other approaches.

By making nature symbolic and letting signs have their own self-organizing abilities, Peirce created a philosophy of habits of nature that reveals a deep connection between our natural and socio-cultural mental thinking and communication through symbols and stories to the effect that aesthetics, ethics, and logics converge synergistically in the summum bonum (Brier, 2014b; Potters, 1997). It is my view that Peirce needs to be updated with reference to modern quantum field theory, but that his philosophical framework can encompass the developments in this area (Brier, 2013). His view can be enlarged and updated by integrating Luhmann’s triple autopoietic system theory in order both to incorporate modern information and communications theory as well as a more developed theory of social dynamics. This is the reason for my creation of the Cybersemiotic framework (Brier, 2017b), a modernized version of Peirce’s pragmaticism (cf. Apel, 1981).

Brian Josephson (forthcoming 2018) has recently been inspired by Peircean biosemiotics and by Karen Barad’s development of Niels Bohr’s complementarity philosophy into an agential realism (Barad, 2017), that makes the biological level of reality as – or even more – fundamental than the physical and thereby clearly steps out of a mechanical ontological view of nature. From a Peircean view, this is a step in the right direction of reflections on the ontological presumptions of modern natural science towards a more semiotic and process-oriented understanding of reality.

Cybersemiotics takes a step further and suggests that the natural, life, social-hermeneutical, and mental-phenomenological sciences are equally ontological fundamental, as one cannot be reduced to any of the others (Brier, 2013). It is in harmony with the quantum physicist Nicolescu’s (2014) definition of transdisciplinarity based on a holistic non-hierarchical ontology of levels, where it is impossible to point out any of them as being most fundamental and the project of reducing one to the other must be given up in order to produce a true transdisciplinary ontology and epistemology.

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