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Cybersemiotics: A New Foundation for Transdisciplinary Theory of Information, Cognition, Meaning, Communication and Consciousness

Abstract

We need to realize that a paradigm based on the view of the universe that makes irreversible time and evolution fundamental, forces us to view man as a product of evolution and therefore an observer from inside the universe. This changes the way we conceptualize the problem and role of consciousness in nature compared to what Descartes did with his dualistic paradigm. The theory of evolution forces us theoretically to conceive the natural and social sciences as well as the humanities together in one framework of unrestricted or absolute naturalism, where consciousness is part of nature. This has influenced the exact sciences to produce theories of information and self-organization in order to explain the origin of life and sense experiences, encouraged biological thinking to go into psychology and social science in the form of theories of selfish genes, socio-biology and evolutionary psychology. But these approaches have still not satisfactorily led to an understanding of why and how certain systems have the ability to produce sense experiences, awareness and meaningful communication. The theories of the phenomenological life world and the hermeneutics of communication and understanding seem to defy classical scientific explanations. The humanities therefore send another insight the opposite way down the evolutionary ladder, with questions like: What is the role of consciousness, signs and meaning in evolution? These are matters that the exact sciences are not constructed to answer in their present state. Phenomenology and hermeneutics point out to the sciences that they have prerequisite conditions in embodied living conscious being imbued with meaningful language and a culture. One can see the world view that emerges from the work of the sciences as a reconstruction back into time of our present ecological and evolutionary self-understanding as semiotic intersubjective conscious cultural historical creatures, but unable to handle the aspects of meaning and conscious awareness. How can we integrate these two directions of explanatory efforts? The problem is that the scientific one is without concepts of qualia and meaning, and the phenomenological-hermeneutic "sciences of meaning" do not have a foundation of material evolution. A modern interpretation of C.S. Peirce's pragmaticistic evolutionary and phaneroscopic semiosis in the form of a biosemiotics is used and integrated with N. Luhmann's evolutionary autopoietic system theory of social

communication. This framework, which integrates cybernetics and semiotics, is called Cybersemiotics.

Semiotics, science and common sense

Inspired by critical realism and Bourdieu's methodology I believe that we only know the surface of reality, and that it is the task of the sciences to dig deeper and look wider than where our common sense knowledge has developed to at the present stage. Furthermore with Gadamer (1989) I do believe that our cultural history is also a development of our knowledge about ourselves, society and nature expanding to a common knowledge horizon. Thus the whole scientific endeavour is to further that development of self- and nature- understanding and knowledge, which I from a biological evolutionary perspective conceive, has the purpose of being a management for the betterment of survival of the species and an attractive meaningful life.

Therefore I agree with Karl Popper that it is the role of great scientist and philosophers to boldly invent new ways of looking at reality, knowledge and ourselves. As it was done for instance by Einstein and Bohr when they changed our views on matter, energy, time, space and knowledge forever in a profound way, or when Norbert Wiener introduced information as a basic ontological component in his transdisciplinary cybernetic world view. I view semiotic philosopher C. S. Peirce as such a bold inventor, who had ideas close to both Popper and Bhaskar, when we come to philosophy of science. But he created a whole architectonic of semiotic philosophy, which includes a transdisciplinary theory of meaning, signification and communication.

What Peirce attempted was to change our worldview in order to encompass the world of science and logic with the world of meaning and communication into a common framework through a triadic evolutionary pragmatist theory of semiotics. This new but partly unfinished approach has attracted many researchers to make a consistent interpretation of his scattered work. See for instance Apel (1981), Boler(1963), Brent (1998) Colapietro (1989), Corrington, R. (1993), Fisch (1986), Deledalle, G. (2000), Esposito(1980), Hookway (1992), Liszka, J. J. (1996), Menand, L. (2001), Parker (1998), Savan D. (1987-1988), Short (2007).

Many researchers, among them Karl-Otto Apel (1981)¹ and Jürgen Habermas (1987) (with a somewhat strange interpretation)², have been attracted by

¹ From the book cover I quote this precise characterization: "As a mediation between theory and praxis, Apel presents pragmatism as the major rival to both existentialism and Marxism, the two other responses to the Hegelian aftermath. In the same context, Apel demonstrates the importance of Peirce's conceptual breakthroughs, in the theory of signs (semiotics) and the theory of rationality, for the challenges and possibilities of a critical theory of society. The contemporary developments of the Frankfurt School, in its third generation now, cannot be understood without Apel's appropriations of Peirce for a grounding of a critical theory of society as formulated in this

Peirce's radically new way of thinking, and it has made a great impression on what became the Copenhagen School of biosemiotics and its members Jesper Hoffmeyer, Claus Emmeche, Frederik Stjernfelt and Søren Brier.. The that has given it a biological reinterpretation of the life phenomenon view is well summarized in Jesper Hoffmeyer's books (Hoffmeyer 1996 and 2008), Donald Favareau (2010) collection of "Essential Readings in Biosemiotics" and as part of Brier's Cybersemiotics (Brier 2008). In cybersemiotics I integrate Peircean biosemiotics with cybernetic view of information into a new transdisciplinary framework based on triadic semiotics and an ontology of emptiness. It is an attempt to produce a transdisciplinary view that solve C.P. Snow's two culture problem. The proposed framework is developing an integrative multi- and transdisciplinary theory of the complex area of cybernetics information science for nature and machine plus the semiotics of all living systems cognition, communication, and culture, with meaning as the overarching topic. It is an integrated transdisciplinary, philosophy of science, and semiotics meta-level from where to monitor our multidisciplinary research endeavor. What is still the problem for the sciences is the phenomenon of meaning and how that can develop from an informational world. The background of this project is the recognition that Western philosophy of science and sciences find themselves in a

systematic reconstruction of modern philosophy. This work is also crucial for an understanding of Apel's own philosophical project of a transcendental pragmatics, or semiotics. With the revival of Peirce studies, and the rediscovery of the pragmatist tradition in American philosophical thinking, this study articulates a very contemporary and relevant interpretation that may challenge and even go against the grain of many so-called Neopragmatists."

² Habermas observes that the insight helping Peirce avoiding positivism was "his understanding that the task of methodology is not to clarify the logical structure of scientific theories but the logic of the procedure with whose aid we obtain scientific theories" (ibid.). It enabled Peirce to arrive at his crucial insight that: We term information scientific if and only if an un compelled and permanent consensus can be obtained with regard to its validity. This consensus does not have to be definitive, but has to have definitive agreement as its goal. The genuine achievement of modern science does not consist primarily in producing true theories that are correct and cogent statements about what we call reality. Rather, it distinguishes itself from traditional categories of knowledge by a method of arriving at an un compelled and permanent consensus of this sort about our views. But Habermas thinks that, Peirce does not go far enough to be able to overcome the correspondence theory of truth completely. He ultimately succumbs to the same objectivist illusion because of his contradictory notion that the un compelled consensus among inquirers aims at technical control. Habermas writes.

"The symbolic representation of matters of fact knowable from the transcendental perspective of possible technical control serves exclusively for the transformation of expression in process of reasoning. Deduction, induction, and abduction establish relations between statements that are in principle monologic. It is possible to think in syllogism, but not to conduct a dialogue in them. I can use syllogistic reasoning to yield arguments for a discussion, but I cannot argue syllogistically with another. Insofar as the employment of symbols is constitutive for the behavioural system of instrumental action, the use of language involved is monologic. But the communication of investigators requires the use of language that is not confined to limits of technical control over objectified natural process. It arises from symbolic interaction between societal subjects who reciprocally know and recognise each other as unmistakable individuals. This *communicative action* is a system of reference that cannot be reduced to the framework of *instrumental action* (Habermas 1987: 137)." (based on Ali Rizvi:

<http://habermasians.blogspot.com/2005/01/habermas-on-peirce-1.html>). Strange interpretation as even the self is dialogical in Peirce's semiotics that again depends on the development of a web of signs getting their meaning from intersubjective social meaningful practise.

state of crisis. Western culture stands in a watershed when it comes to taking the final step into a *knowledge culture* based on information and communication technology. Rather than basing our culture on the conception of an abstract unembodied, globally available (artificial, impersonal) intelligence of information programs as the highest goal of knowledge; we believe that we should ground our culture(s) on human embodied localized, living, creative personal as well as interpersonal semiotic intelligence, as part of both living nature and human culture.

Current, dominant objectivist science, including physicalism, eliminative materialism, and cognitive sciences based on the information processing paradigm, including (second order) cybernetics, cannot encompass self-aware consciousness and social-communicative meaning as causal agents in nature. Current cognitive science attempts to explain human communication from outside, without recognizing the phenomenological and hermeneutical aspects of existence. Its conception of human (meaningful) language and communication as a sort of culturally developed program for social information processing between computational brains/minds cannot explain the evolution of embodied consciousness and human (meaningful) language and communication in its. In order to ground the transdisciplinary model in a new *ontology* that can encompass the ontologies of all four dimensions or spheres. This is what I find attractive by C.S. Peirce's pragmatist evolutionary semiotic process philosophy. Here semiotic social interaction between embodied minds in nature and culture is viewed as the central process of knowledge production.

C.S. Peirce's triadic, evolutionary, realist pragmatist semiotics

It was Charles Sanders Peirce (1839-1914), who developed a paradigm, based on a similar concept of chaos as Prigogine's, (Prigogine and Stengers 1995) where chaos is fundamental to an evolutionary view of the creative universe³. But Peirce's theory is intersubjective and phenomenological⁴ and those both different from Prigogine's evolutionary conceptions and from Husserl's individually oriented phenomenology, which does not have evolution in its foundational conceptions. Peirce calls his phenomenology - which differs from Husserl's among other things exactly on this semiotic intersubjective foundation - for *phaneroscopy*. As Peirce begins with observation and intersubjectivity, he further denies that we have a special ability for introspection behind language

³ I do not have space here to go deeper into the work of George Spencer-Brown and how close some of his basic intuitions are to Peirce's triadic semiotics. But see Brier (2009a and b.) for this work, which also – like Brier (2008a) – goes deeper into the analysis of second order cybernetics, autopoiesis and the way Niklas Luhmann's work on communication manages to integrate these two paradigms with Bateson's into a grander system theoretical synthetic work.

⁴ I am not going to very specific in my Peirce exegeses here as I have written extensively on it in my book and the papers mentioned in the references. Thus you get a summary of the interpretation I have worked up so far.

and our embodied sign games. All of our knowledge is intersubjective and the dichotomy of internal/external is not foundational for Peirce, though is useful in other connections. Even our own phaneroscopic self is for Peirce a sort of sign that has developed through our whole life summing up and structuring all our experience into - what he in his terminology calls - a *symbol* (Colapietro 1989). Peirce views the universe in another of his signs types, namely as a grand argument, which we are trying to decipher.

The heart of the Peircean phaneroscopy is his system of categories. They are basic to the understanding of his theory of signs and indeed of his thought as a whole. They are a unique critique and development of Kant's categories that laid the foundation of modern philosophy and philosophy of science.

Peirce's *On a new list of categories* (Peirce, CP 1.551) presents his categories as distilled from the logical analysis of thought and regarded as applicable to being, but Peirce also has a phenomenological analysis leading to his phaneroscopy as we shall see below. His forerunners and idols are Aristotle and Kant. Aristotle listed ten categories and Kant twelve. Inspired by Kant, Peirce searches for the basic categories behind the semiotic knowledge dynamics, and finds them through extensive analysis over long time. Peirce finds that there are three and only three categories basic categories that are part of all kinds of cognition (Colapietro 1989). This is an aspect of Peirce's theory that is distinct from Husserl's. Peirce sees that meaning and interpretation cannot be reduced to less than three categories, like for instance it is done in Saussure's (1969/1916) structuralist and dualistic semiology, which does not deal with the reference to some kind of external reality outside language. It only deals with internal differences in the semiotic and linguistic systems. But Peirce's semiotics is a realistic theory and so much more as we shall see (Fisch 1986 and Bolter 1963).

These three categories he has found are so general that he called them: *Firstness*, *Secondness* and *Thirdness*. The most difficult of the categories to discuss is Firstness, which is, among other things, the category of *pure feeling*. Peirce writes that Firstness is

"an instance of that kind of consciousness which involves no analysis, comparison or any process whatsoever, nor consists in whole or in part of any act by which one stretch of consciousness is distinguished from another, which has its own positive quality which consists in nothing else, and which is of itself all that it is, however it may have been brought about; so that if this feeling is present during a lapse of time, it is wholly and equally present at every moment of that time A feeling, then, is not an event, a happening, a coming to pass . . . a feeling is a state, which is in its entirety in every moment of time as long as it endures." (Peirce CP1.306).

The categories are Peirce's suggestion for a new and broader epistemological and ontological paradigmatic framework. Thus they have far-reaching

consequences for his ontology, theory of knowledge and semiotics. He writes, in his further explanation Secondness and the difference between that and Firstness:

“Indeterminacy, then, or pure firstness, and hæcceity⁵, or pure secondness, are facts not calling for and not capable of explanation. Indeterminacy affords us nothing to ask a question about; hæcceity is the ultimate ratio, the brutal fact that will not be questioned. But every fact of a general or orderly nature calls for an explanation; and logic forbids us to assume in regard to any given fact of that sort that it is of its own nature absolutely inexplicable. This is what Kant calls a regulative principle, that is to say, an intellectual hope. The sole immediate purpose of thinking is to render things intelligible; and to think and yet in that very act to think a thing unintelligible is a self-stultification. ... Despair is insanity. ... We must therefore be guided by the rule of hope, and consequently we must reject every philosophy or general conception of the universe, which could ever lead to the conclusion that any given general fact is an ultimate one. We must look forward to the explanation, not of all things, but of any given thing whatever.” (Peirce, CP 1.405)

This last description of the regularity and intelligibility of things and events is the category of Thirdness that connects the potentiality of Firstness and the single brute facts or that which make resistance in our measurement in the world, which he calls Secondness. Peirce underlines that one needs to accept Thirdness if one believes that any kind of general explanation – and therefore science – is possible. To know anything there must be a potentiality, but also hæcceity as an unexpected (as Spencer-Brown and Luhmann would say) perturbation of (the autopoietic system) in form of a difference. When we realize that the difference has some regular relation to something else, we interpret it as having meaning in our life (the difference makes a difference). Peirce is inventing a relational process logic that puts his thinking quite close to Whitehead’s *Process and Reality* (1978).

Thus we see the original fact as information of some kind of regularity of an object (physical, psychological or sociological) and we make an interpretant in our consciousness. The triadic connection is what emerges as a sign! The sign is a connection between a Representamen (a possible sign vehicle) and an Object (which can be almost anything including an idea or the movement of a hand) and an Interpretant of let’s say the hand movement, which we interpret as a greeting. Thus the hand moving has an independent existence as an object, but it has the potentiality of being a sign; namely the hand waving of the cultural invention of greeting we call ‘hello’. This turns this object into a Representamen and the real object, to which it refers, is shown to be ‘a greeting’ and the Interpretant to be ‘he greets me because he knows me/recognizes me and

⁵ Suchness understood as the brute appearance of force, will and resistance between two phenomena.

confirms our relationship'. Thus Peirce's triadic semiotics is built on the internal dynamical processes of the three categories and as such inseparable from them⁶ like Hegel's dialectics which was also an inspiration for Peirce.

Most researchers find the categories hard to understand. I think it is because they change the view of the world and knowledge in order to make the connection between mind, matter, meaning and logic in what he calls *pragmatism*. Peirce is close to Whitehead's process philosophy, except that Peirce gives his theory the form of a semiotics. But Whitehead agrees about the necessity of metaphysical categories. In *Process and Reality* Whitehead (1978) defends a position very close to Peirce's own. He writes:

Philosophy will not regain its proper status until the gradual elaboration of categorial schemes, definitely stated at each stage of progress, is recognized as its proper objective. There may be rival schemes, inconsistent among themselves; each with its own merits and its own failures. It will then be the purpose of research to conciliate the differences. Metaphysical categories are not dogmatic statements of the obvious; they are tentative formulations of the ultimate generalities.

(Whitehead 1978:8)

Peirce is the father of the American Pragmatism, but later in protest of the way his friend William James developed this paradigm, he reinvented it as Pragmaticism (Fisch 1986). The basic problem for many is also that he connects - what we usually think of as the external and the internal world - through his categories - as if there was a Möbius band between them. The Möbius band seems to have two sides, but actually only has one continuous side. Peirce's semiotic philosophy draws part of its transdisciplinary potential from being philosophy of continua or plenary or fields on which we shall return.

The basic ontological foundation in Peirce's philosophy is *Thycism*. This ontological conception sees chance and chaos as basic characteristics of Firstness. This is combined with an evolutionary theory of mind (*Agapism*), where mind has a tendency to form habits in nature. Chaos and chance is seen as a First, which is not to be explained further (for instance, by regularities). Thirdness is the basis of habit forming and evolution. The chaos of Firstness is not seen as the lack of law, as it is in mechanicism and rationalism, but as something full of potential qualities to be manifested individually in Secondness and as general habits and knowledge in dynamic objects and semiosis in Thirdness.

⁶ I write this because I often meet researchers who like Peirce's semiotics but not his categories and think they can get the one without the other. I do not think that it possible unless they define another foundation that can explain the dynamics.

Peirce thus uses the concept of Firstness to connect foundational consciousness as a pure chaos of feeling and qualia with a tendency to take habits through evolution. Thus he agrees with Prigogine and many others - for instance the quantum field theory's idea of a vacuum field with virtual particles - about an original chaos of potential forms. The ontology is somewhere between Plato and Aristotle. In Peirce's semiotic philosophy the forms are only potential; they are not there as such in the transcendental or in the things in themselves in a dualism of form and matter and furthermore in contrast to both Plato and Aristotle, Peirce thinks evolutionary. But he shares Aristotle's view of matter as continuous *hylé*, which is somehow potentially alive in side! Mind and matter is on different end of a continuum! He this opposes to Descartes' absolute ontological dualism.

Many researchers consider his world view, even though it is a form of realism, to be a kind of objective idealism, with certain characteristics in common with Hegel's dialectically developing spirit (Boler 1963). Peirce's triadic semiotics has some of the same role as Hegel's dialectics in describing evolution and certain principles for its development. But it is a semiotics he develops, not a dialectics. There is no 'Aufhebung' and thesis-antithesis fighting each other to produce a new level of synthesis. Peirce writes on the difference between Hegel's and his own philosophy the following,

"Hegel, in some respects the greatest philosopher that ever lived, ...brought out the three elements much more clearly [than Kant did]; but the element of Secondness, of hard fact, is not accorded its due place in his system; and in a lesser degree the same is true of Firstness." (Peirce CP 1.425)

One of Peirce' answers to the problems of Hegel's idea of an objective idealistic theory of evolution based on the dialectical internal dynamism were his idea of hyperbolic evolution. He has formulated in a very concentrated way in a letter to Christine Ladd-Franklin, *On Cosmology*, which makes it possible for us to present the theory in overview by his own hand if you keep in mind the basic concepts that I have already presented: In this he also present a new foundational element in his ontology namely a concept of emptiness or nothingness as something being "before" and "below" the world of the three categories and time and space:

"...my cosmology. ...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 chaos, *tohu bohu*, the nothingness of which consists in the total absence of regularity. The state of things in the infinite future is death, the nothingness of which consists in the complete triumph of law and absence

of all spontaneity. Between these, we have on our side a state of things in which there is some absolute spontaneity counter to all law, and some degree of conformity to law, which is constantly on the increase owing to the growth of habit.”

Thus the world is not a machine driven by absolute exact laws, but a system that manifests and develops new regularities or habits through Thirdness, as is Peirce’s paradigmatic concepts. He continues:

The tendency to form habits or tendency to generalize is something which grows by its own action, by the habit of taking habits itself growing. Its first germs arose from pure chance. There were slight tendencies to obey rules that had been followed, and these tendencies were rules which were more and more obeyed by their own action. There were also slight tendencies to do otherwise than previously, and these destroyed themselves. To be sure, they would sometimes be strengthened by the opposite tendency, but the stronger they became the more they would tend to destroy themselves....

Thus a small tendency to take habits grows by itself and will make other habits. In systems thinking and non-equilibrium thermodynamics we call it self-organization. But, what then is this tendency to take habit? Is it a pure mechanical material thing? Peirce continues:

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. Accordingly, time may have been evolved by the action of habit.....

Thus Peirce has a un-mechanical theory of irreversible evolution like Prigogine and Stengers (1985). Peirce further he believes in a continuity theory of matter and mind. It is a continuum theory where mind is dominant in the one end and matter in the other. But when we only see matter there is still mind inside in this hylozoist theory that is close to Aristotle’s original view. But Aristotle did not have the same kind of evolutionary theory as Peirce did. He continues.

The first chaos consisted in an infinite multitude of unrelated feelings. As there was no continuity about them, it was, as it were, a powder of feelings. It was worse than that, for of particles of powder some are nearer together, others farther apart, while these feelings had no relations, for relations are general. Now you must not ask me what happened first. This would be as absurd as to ask what is the smallest finite number. But springing away from the infinitely distant past to a very very distant past, we find already evolution had been going on for an infinitely long time. But this "time" is only our way of saying that something had been going on. There was no real time so far as there was no regularity, but there is no

more falsity in using the language of time than in saying that a quantity is zero. In this chaos of feelings, bits of similitude had appeared, been swallowed up again. Had reappeared by chance. A slight tendency to do otherwise than previously, and these destroyed themselves. To be sure, they would sometimes be strengthened by the opposite tendency, but the stronger they became the more they would tend to destroy themselves....

But the Chaos of Firstness is not consisting of dead forces and laws as it has an element of feeling awareness. Still it is physical, but in a much broader concept than mechanical materialism of classical physics. Peirce's concept is closer to the original much broader Ionic concept of Physis. Peirce writes from this conception about the development of irreversible time:

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. Accordingly, time may have been evolved by the action of habit.... The first chaos consisted in an infinite multitude of unrelated feelings. As there was no continuity about them, it was, as it were, a powder of feelings. It was worse than that, for particles of powder some are nearer together, others farther apart, while these feelings had no relations, for relations are general. Now you must not ask me what happened first. This would be as absurd as to ask what is the smallest finite number. But springing away from the infinitely distant past to a very very distant past, we find already evolution had been going on for an infinitely long time. But this "time" is only our way of saying that something had been going on. There was no real time so far as there was no regularity, but there is no more falsity in using the language of time than in saying that a quantity is zero. In this chaos of feelings, bits of similitude had appeared, been swallowed up again. Had reappeared by chance. A slight tendency to generalization had here and there lighted up and been quenched. Had reappeared, had strengthened itself. Like had begun to produce like. Then even pairs of unlike feelings had begun to have similars, and then these had begun to generalize. And thus relations of contiguity, that is connections other than similarities, had sprung up. All this went on in ways I cannot now detail till the feelings were so bound together that a passable approximation to a real time was established. It is not to be supposed that the ideally perfect time has even yet been realized. There are no doubt occasional lacunae and derailments."

(Peirce: CP 8.316-18)

Thus though this is based on an irreversible concept of time and evolution Peirce denies that a time for the origin can be determined. He is here close to Augustine and Einstein who both claims that the universe is made with time, rather than being made in time! No original cause of the universe can be determined as the chance of creation is there "all the time" as it comes from a layer of existence

that has almost no time. Today we would say that it is close to the Planck scale, which determines the least measurable quantity of time and length. This is thus Peirce's general pragmaticistic and realistic but non-reductionist evolutionary world view, working from an infinite chaos of feelings as the first level of manifest reality in the form of a mere potentiality. A modern interpretation including the knowledge of quantum field physics, would have to say that this level must be "before" or more basic than the quantum vacuum field of virtual particles or probability waves, which is still a pure materialistic conception though it can contain a statistical concept of information. Peirce's idea of how the brute facts of resistant otherness can arise from Firstness is close to the way quantum field physics describe how the quantum vacuum field functions with virtual particles in pairs of matter and antimatter springs forth from the field for a short moment and then dissolve by merging with each other. But should one for instance come too close to the event horizon of a black hole and be swallowed up, the other will emerge as a manifest particle (secondness in Peirce's concepts). We shall describe the ideas of Peirce more below. Let us finish this section with Peirce's summary of how he views philosophy and its relation to the sciences:

" Philosophy has three grand divisions. The first is Phenomenology, which simply contemplates the Universal Phenomenon and discerns its ubiquitous elements, Firstness, Secondness, and Thirdness, together perhaps with other series of categories. The second grand division is Normative Science, which investigates the universal and necessary laws of the relation of Phenomena to Ends, that is, perhaps, to Truth, Right, and Beauty. The third grand division is Metaphysics, which endeavors to comprehend the Reality of Phenomena. Now Reality is an affair of Thirdness as Thirdness, that is, in its mediation between Secondness and Firstness..."

(Peirce: CP 5.121)

It is on this philosophical basis that Peirce builds his semiotics.

Semiotics

Semiotics (from the Greek word for sign) is the doctrine and science of signs, their use and how they produce and convey meaning. It is thus a more comprehensive system than language itself and can therefore be used to understand language in relation to other forms of communication and interpretation such as non-verbal forms including cognition and interpretation. One can trace the origins of semiotics to the classical Greek period (from the medical symptomology of Hippocrates) and follow important developments in the middle Ages (Deely 2001). John Locke (re)introduces the label in the 17th century. But modern *semiotics* starts its development in the 19th century with Charles S. Peirce (1839-1914) and with Ferdinand de Saussure (1857-1913), whose paradigm is usually called *semiology*.

But today semiotics is often used as a meta-term for both. The two researchers were working independently of each other. Saussure never wrote a book on semiotics himself. His *Cours de Linguistique Generale* is reconstructed from students' notes after Saussure's death in 1913. Nevertheless it founded modern linguistic theory. Though *semiotics* is now the recognized term for the common area of Saussure's and Peirce's work, they differ in conceptions of sign. Saussure's is dualistic and language internal, looking at language as a system. Peirce's is triadic and with external realistic reference in that he combines a Representamen, with an Object through the creation of an Interpretant constructed by the observing system.

Let us look at nine different examples of signs and discuss the difference in the sign concept from there. A sign stands for something for somebody in some aspect: 1. as the word 'blue' stands for a certain range of color, but also has come to stand for an emotional state. 2. As the flag is a sign for the nation (a symbol). 3. As a shaken fist can be a sign of anger. 4. As the red spots on the skin can be a sign for German measles (Rubella) 5. As the wagging of the dog's tail can be a sign of friendliness towards both dogs and humans. 6. As pheromones can be a sign of heat to the other gender of the species. 7. As the hormone Oxytocine from the pituitary can be a sign to the cells in lactating glands of the breast to release milk.

Semiologists would usually not accept examples 4-6 as genuine signs, because they are not self-consciously intentional human acts of communication. But Peirce's triadic, pragmaticistic, transdisciplinary, evolutionary doctrine of signs accepts also non-consciously-intentional signs in humans and between animals (nr. 5 and 6) as well as between animals and humans (nr. 4), non-intentional signs (nr. 4), and signs between organs and cells in the body (nr. 7) for instance as *immunosemiotics* dealing with the immunological code, immunological memory and recognition.

The development of semiotics to a transdisciplinary scientific field is mostly based on Peirce's triadic evolutionary and pragmaticistic semiotics. Although semiotics emerged in efforts to investigate scientifically how signs function in culture, the 20th century has witnessed efforts to extend semiotic theory into the non-cultural realm, primarily in relation to living systems and computers. As Peirce's semiotics is the only one that deals systematically with non-intentional signs of the body and of nature at large, it has become the main source for semiotic contemplations of the similarities and differences of sign of inorganic nature, signs of the living systems, signs of machines (Nöth 2002 and 2009) and the cultural and linguistic signs of humans living together in a society when we search for information and knowledge.

A sign - in its broadest Peircean definition - is then: *Anything that stands for something for somebody in some respect or capacity in certain situations in a certain way.* A sign - or a Representamen - is a medium for the communication of a form in a triadic relation. The Representamen refers to its Object, which determines

it and to its Interpretant, without being itself affected. The Interpretant is the interpretation in form of a more developed sign in the mind of the interpreting receiving mind or quasi mind. The Representamen could be for example a moving hand that refers to an Object (the concept of waving) for an Interpretant that is the interpretation in my mind materializing as the more developed sign 'waving', which is a cultural convention and therefore a symbol (see below).

All kinds of alphabets are composed of signs. Signs are mostly imbedded in a sign system based on codes (see below) like for instance alphabets of natural and artificial languages or ritualized behavior of animals where fixed action patterns like feeding the young in Gulls can get a sign character when used in the mating game. This last aspect from ethology was included under zoösemiotics by Thomas Sebeok in the 1960s (Sebeok 1965 a, b), which then started to encompass animal's species-specific communication systems and their signifying behavior under the name zoösemiotics in 1972, resulting in the book *Perspectives in Zoösemiotics*.

Later Sebeok decided that zoösemiotics rests on a more comprehensive science of biosemiotics, a name that was coined in the beginning of the 1990s (Sebeok and Umiker-Sebeok 1992). This global conception of semiotics equates life with sign interpretation and mediation and a view of semiotic that encompasses all living systems including plants (Krampen 1981), bacteria and cells, for instance in the human body (called *endosemiotics* by Uexküll et. al. 1993). According to one standard scheme for the broad classification of organisms, five super kingdoms are now distinguished: protists; bacteria; plants; animals; and fungi, thus the major classification categories in biosemiotics are: *bacteriosemiotics*, *protistosemiotics*, *phytosemiotics*, *mycosemiotics*, and *zoosemiotics*. Within zoosemiotic antroposemiotics encompasses the traditional semiotics of language and culture mostly inspired by Saussure, but it is built on the foundations of the other levels mentioned, which is not present in structuralist semiology.

Ever since Umberto Eco (1976) formulated the problem of the "semiotic threshold" keeping semiotics within the cultural sciences, semiotics - especially Peircean semiotics - has developed further into the realm of biology crossing threshold after threshold into the sciences. The ethology developed by Lorenz (1970-71) and Tinbergen (1973) from the 1920'th and on (inspired by Jacob von Uexküll) has for long pointed out that animals do react to certain aspect of nature or other animals as signs to be interpreted in fixed action patterns, and that animals communicate with these in a ritualized form that gives some of them a symbolic character (Brier 2008a). The efforts of Thomas Sebeok (see for instance Sebeok 1965 a+b, 1989, 1990, Sebeok and Danesi 2000, Sebeok and Umiker-Sebeok 1992) and Hoffmeyer (1996 and 2008) as well as Emmeche (Emmeche 1998 + Hoffmeyer and Emmeche 1991) have led to the development of a biosemiotics encompassing all living systems, including plants (Krampen 1981) and micro-organisms as sign generators and users (Nöth 2001). This many humanistic researchers find hard to accept, and accuse Peirce of defining the

concept of sign too broadly by going outside intentional communication (Sonnesson 2009).

Resulting developments have then been deployed to change the scope of semiotics from only cultural communication to a Biosemiotics that also encompasses the cognition and communication of all living systems from the inside of cells to the whole biosphere and a Cybersemiotics (Brier 2008 a) which in addition encompasses a theory of information systems as biological, psychological and social autopoietic (Luhmann 1990 and 1995).

Biosemiotics

Biosemiotics (bios=life & semion=sign) is a growing field that studies the production, action and interpretation of signs, such as sounds, objects, smells, movements but also signs on molecular scales in an attempt to integrate the findings of biology and semiotics to form a new view of life and meaning as immanent features of the natural world. Life and genuine semiosis are seen as co-existing. The biology of recognition, memory, categorization, mimicry, learning and communication are of interest for biosemiotic research, together with the analysis of the application of the tools and notions of semiotics such as interpretation, semiosis, types of sign and meaning. The biosemiotic doctrine accepts non-consciously-intentional signs in humans, non-intentional signs, also between animals as well as between animals and humans, and signs between organs and cells in the body and between cells in the body or in nature. Thus the biological processes between and within animals transcend the conceptual foundation of the other natural sciences. Many biosemioticians base their research on parts of Peirce's semiotics (Brier 2009).

There has been a well-known debate about the concepts of primary and secondary modeling systems (see e.g., Sebeok and Danesi 2000) in linguistics that has now been changed by biosemiotics. Originally language was seen as the primary modeling system, whereas culture comprises the secondary one. But through biosemiotics Sebeok has argued that there exists a zoösemiotic system as the foundation of human language, which has to be called the primary one, thus language becomes the secondary, and culture the tertiary system. Biosemiotics now has its own journal *Biosemiotics* and a books series at Springer's; this new area is still controversial for many cultural and linguistic semioticians as is the broadening of the concept of code.

The concept of code

A code is a set of transformation rules whereby messages are converted from one form of representation to another like in cryptography or Morse code. Thus, by code is very broadly meant everything of a more systematic nature - "rules" - that the source and the receiver must know *a priori* about a sign for it to

correlate processes and structures between two different areas, as for instance the Morse code. But now the term code – for some without meaning and interpretation inspired by information theory - is also introduced at the level of cells because a more local concept of connecting order than universal laws was needed. The advantage of using the concept of code over law is because codes in contrast to universal laws only work in specific contexts, and interpretation is based on more or less conventional rules be they cultural or (here is the extension) biological, such as the DNA-code.

In the protein production system including the genome in the nucleus, the RNA molecules going in and out of the nucleus, and the Ribosomes outside the nucleus membrane triplet base pairs in the DNA can be translated to a (messenger) RNA- molecule and then read by the Ribosome as a code for amino acids to string together in a specific sequence to make a specific protein. Thus Sebeok (1992) writes of the genetic code as well as of the metabolic, the neural and the verbal code. Thus living systems are self-organized not only on the basis of natural laws but on codes developed in the course of evolution. In the overall code can often be sub-codes grouped in a hierarchy. To view something as encoded is to interpret it as *sign-ment* (Sebeok 1992). Thus, in most biosemiotics the concept of code is always connected to meaningful semiosis, though not in Barbieri's "code-semiotics". Information science on the other hand is built "bottom up" and is not based on concepts of meaning and interpretation. Thus the code concept in biosemiotics has landed in a tug-of-war situation.

A symbol in Peircean semiotics is a sign where the code is conventionally and arbitrarily defined. It can be a word in common language, but gestures and things like flags, presidents, and specific events like a soccer match can be symbols (here for example of national pride). Biosemioticians claim that the concept of symbol goes beyond cultures, as some animals have signs that are "shifters". This points to the fact that their meaning changes with situations, as for instance the feeding behaviour of young by adults, which also appears as a behavioural sequence in the mating game or the head-tossing of the herring gull, which also occurs both as a pre-coital display but also when the female is begging for food (Sebeok 1965 a).

Now here it is not the individual that is the interpretant but the species or breeding line. Such a transdisciplinary broadening of the concept of a symbol is a challenging development for many linguists and semioticians working only with human culture and language. For instance Zlatev (2009 a and b) works on developing a hierarchy of sign levels.

Life can be understood from a chemical point of view as auto-catalytic, autonomous, autopoietic systems, but that does not say much about how individual biological self and awareness appears in the nervous systems. Hormones and transmitters do not in the living system function only on a

physical causal basis. Not even the chemical pattern fitting formal causation is enough to explain how sign molecules function, because their effect is temporally, situational and individually contextualized. Sign molecules like hormones and neurotransmitters work also on a basis of final causation supporting a purpose in the survival of the self-organized biological self. As Sebeok (1992) points out, the mutual coding of sign molecules from the nervous, the hormone and the immune system is an important part of the self-organizing of a biological self, which again is in constant recursive interaction with its *Umwelt* (Uexküll 1934).

This produces a view of nerve cell communication based on a Peircian world view binding the physical efficient causation described through the concept of energy, the chemical formal causation described through the concept of information with the final causations in biological systems described through the concept of semiosis (Brier 2008 a) on the basis of connecting Firstness, Secondness and Thirdness.

From a Cybersemiotic point of view, information science's bit or basic difference is only a sign if it is "...a difference that makes a difference". Bits working in the computer for the computer are not signs in themselves as they do not need living system with final causation to interpret them. They work through formal causation that is the interaction through differences and patterns. The computer is a "differences machine", a duality based system.

As Peirce's sign is triadic, a Cybersemiotics based on his semiotics include information, and bits as only pre or quasi signs in themselves (Nöth 2001, 2002 and 2008). Codes inside a computer used by the computer is viewed as proto-sign as they are dyadic and do not require a self-organized "quasi-mind or self" to have causal effect, but work like a key in a lock. But when we see them as encoding for language in a word processor program, they are signs for us.

Sign making is thus immanent in nature, but manifest only in full triadic semiosis within living systems. The informational level is seen as intermediary between the physical world of energy, matter, and forces and the semiotic world. Cybersemiotics has so far sided with biosemiotics in not accepting a full-fledged pan-semiotics, but presents a compromise through an evolutionary model.

A Cybersemiotic theory of emergence

I have argued through the article that we have not yet arrived at a well-functioning and consistent theory of emergence. See for instance El-Hani (2008), where the need for a shift to process ontology or to Peircean semiotic philosophy is suggested as ways out of this serious problem. The more quantum physical aspects are worked out in Penrose (1995) and Stapp (2007). Baer (2010) attempts to combine quantum physics and process philosophy in his discussion of the physics of consciousness. This lack of a good theory of emergence is a problem, as the task of such a theory is to explain how the qualities of life and sense experience and therefore qualia plus

the next step to linguistic born self-consciousness in humans living in a culture can be created in the course of evolution. I have pointed out that not even complexity theory combined with non-equilibrium thermodynamics and theories of self-organization, even including autocatalysis and autopoiesis in a monistic and realistic setting, perhaps combined with general system theory where there is a holistic belief that the whole is more than the sum of the parts, can explain how the ability to experience and be aware of oneself and the environment can happen. I cannot deny that some computer science philosophers like Arrabales, Ledezma and Sanchis (2010) actually believe that there are small beginnings of consciousness in the form of agency in AI robots, and try to make scales to measure them. I find it highly unlikely that we are in any way near stages in development of AI and AL, where life worlds might emerge. So, the cybersemiotic view of the relation between information and semiosis is that information belongs to Secondness, and must be considered protosemiotic. When going into Thirdness, the possibility of an interpretant appears, as Peirce underlines, and as Varela shows in his calculus of self-reference. But there are certain conditions for a system to be able to create an interpretant within our space and time frame that must be met first. One of them is the closure and self-organization of autopoiesis in a living system, in order to be able to create an interpretant within our space and time frame. But we probably need to add more. Hoffmeyer (1998) describes four additional steps necessary for the creation of living systems:

1. The establishment of an inside-outside asymmetry (closed surface).
2. A proto-communication over those surfaces (a community of surfaces).
3. A digital re-description in the form of DNA to carry on the form of the organism in procreation (Hoffmeyer and Emmeche (1991) call it *code-duality*).
4. The formation of an interface (inside-outside loops) is essential for the creation of interpretants.

Machines lack autopoiesis, reproduction, code-duality, and an inner organization of membranes (Hoffmeyer 1998), and thus also lack both individual-based and species-based motivation and intentionality, and consequently also the ability to establish a genuine interpretant. Therefore I think that instead somehow we must enlarge the conceptual framework within which we conduct science, if we want to form connections with the phenomenological aspects of reality and the experiences of meaning. It is my belief as I have argued here that Peirce's triadic semiotics deliver a possible first steps towards such a solution.

On the level of organic and cognitive evolution, Hoffmeyer has in his development of a biosemiotics, built on an approximation to Peirce's ontology, suggested adding a new level of meaning to the reductionistic Darwinian "survival of the fittest". This

survival idea tells a lot about rather primitive organism, but there must be something more as we get to more and more complicated organisms with nervous systems. Neither maximal dissipation of entropy nor survival is enough to explain the growth of systems with inner worlds of qualia. What is it that they acquire more of? Hoffmeyer suggests calling it *semiotic freedom* and explains it this way:

"The most pronounced feature of organic evolution is not the creation of a multiplicity of amazing morphological structures, but the general expansion of 'semiotic freedom', that is to say the increase in richness or 'depth' of meaning that can be communicated"

(Hoffmeyer 1996: 61).

It is a very crucial point that Hoffmeyer tends to here, because this is where the possibility of meaning comes into an enlarged framework where science is also possible on a basis that is close to Prigogine's complexity theory for thermodynamics, but adding the Peircean framework and his theory of mind. *The play of signs in the freedom of consciousness* becomes an attractor in cosmogony and evolution.

Connecting this to the problem of emotion and inner reward in ethology that Lorenz could not solve within his standard materialistic biological framework, and by using von Uexküll's Umwelt-concept in an evolutionary context⁷, cybersemiotics regards the Umwelt as a sphere of signification (signification sphere), created by every living system, as the primary living space (life world). What ecologists call the ecological niche in the habitat becomes a meaningful sphere, a signification sphere for the living system. Seen from an ecosemiotic view it is a *semiotic niche*, as Hoffmeyer calls it.

The production of meaning is thus brought into what mechanismism sees as "dead" nature by the concepts of Firstness and Synechism combined with Hylozoism and the development of the universe through three different kinds of evolution:

1. *Thyctic evolution* (free or random variation, sometimes called fortuitous) like Darwin's natural selection.
2. *Ananchastic evolution* (dynamic dyadic interactions, a more mechanical necessity). It comes closest to Hegel's idea of evolution.
3. *Agapastic evolution* or "Evolutionary Love" (combining the free variation and dyadic interactions through habit formation by the mediating ability of Thirdness). This comes closest to Lamarck's idea of evolution (Brent 1998: 215).

⁷ Jacob von Uexküll did not believe in evolution, so his theory did not include evolution in its foundational framework

Life can be understood from a chemical point of view as auto-catalytic, autonomous, autopoietic systems, but that does not say much about how individual awareness appears in nervous systems. On the basis of Peirce's philosophy, the emergence of signs and meaning in the living world is to be expected. It is also clear that the world in its vague beginnings was not created with signs as we understand them in biosemiotics, but only a tendency to make them emerge through the law of mind. This could be called a vague tendency to final causation that evolved from the tendency to form habits.

The Cybersemiotic interpretation of causality based on Peirce is that efficient causation can exist on its own as Secondness, but it is often found embedded in the formal causations of pattern fitting and signals described in information science and then in the living world clearly by final causation, which becomes conscious purpose in human society. Information seen as both protosemiosis, in evolution, and quasi-semiosis, when embedded in semiotic and linguistic processes, is between the two. It is connected to formal causation and works through signals and dualities of patterns, not yet a fully triadic semiosis, but still above the brute force of efficient causation.

The heterarchical levels of evolutionary cybersemiotic emergence

The cybersemiotic approach that I present here unites cybernetic, systemic, informational, and semiotic approaches towards self-organization, intentionality, selection of differences, and constructivism, thus avoiding solipsism and idealism. Modern systems thinking views nature as containing multilevel, multidimensional hierarchies of inter-related clusters forming a heterogeneous general hierarchy of processual structures: A hierarchy.

Levels are believed to emerge through emergent processes, when new holons appear through higher-level organization. I have been skeptical about the ability of this paradigm to account for the emergence of life and sense experience and later linguistic borne self-consciousness. But if this system and cybernetic view is placed into a Peircean framework, where living potentialities (Firstness) are processes manifested through constraints and forces (Secondness) into regularities and patterns (Thirdness) in a recursive manner from level to level, it makes much more sense. The new emergent level then acts as a potential for the development of the next level. Levels can form and dissolve when their dynamical parameters are near critical points. Stabilization requires that the system moves further from the critical point into organizing patterns, like energy wells. But one then has to accept a hylozoist view of matter as Hylé.

In hierarchies there is a filtering of lower-level effects rising from the bottom at each new emergent level. There is also a binding from the top, and the exclusion of alternative possibilities, once one path of emergence has stabilized (Downward causation). Across levels, various forms of causation (Efficient: based on energy transfer, Formal: based on pattern recognition, signals, and information, and Final:

based on meaningful purpose and thus semiotic) are more or less explicit (manifest). This leads to more or less explicit manifestations of information and semiotic meaning at the various levels in the world of energy and matter. The basic forms of causation can be seen at all levels. Material causation is basically grounded in the Quantum vacuum fields. But for each level of material-informational manifestation the lower level beneath it acts as its material basis.

Emergent process laws are peculiar to each level, allowing components to function together, and stabilizing levels in pattern-formation and structure that can be described with an objective information concept. This yields the dynamical integration that individuates each level. In the special case in which this integration involves active organizational processes we have autonomy, which through autocatalytic closure creates agency. It seems that total closure, as in autopoiesis, is important in the creation of living systems and the emergent quality of individuality laying the foundation for subjectivity.

Meaning is generated through the whole heterarchy, especially through the relations of individual systems to a larger natural or social context. Thus, meaning is generated both on the individual levels of the living or humans and in social systems. But meaning is most manifest in the living systems that fulfill Hoffmeyer's conditions. The most full-blown version of meaning involves finality in a self-conscious social-linguistic mind.

But starting from dissipative systems, one can define a heterarchy of pre-living self-organized systems as based on degrees of closure, asymmetry between inside and outside, proto-communication over membranes, digital representation, and formation of interfaces.

The ontological basis of Cybersemiotics:

Information theory is now an important part of the new science of consciousness research program, but there is a lot of work to do for serious philosophy, considering how many central philosophical topics of mind, language, epistemology, and metaphysics are going to be affected by the biosemiotic development. Peircean biosemiotics may contribute to a new transdisciplinary framework in understanding knowledge, consciousness, meaning and communication. But to do this, new elements has to be integrated making it possible to unite the functionalistic approaches to information and communication coming from cybernetics and computer science with the semantic pragmatic approaches coming from the linguistic turn and semiotics. Concepts of closure, self-organization, and differentiation of biological, psychological, and social systems developed in second-order cybernetics and autopoiesis theory need to be integrated into theories of embodiment and Peircean biosemiotics.

Let us try to summarize and schematize the basic ontological concepts of Cybersemiotics made be an integration of Peirce's semiotic philosophy:

1. The first level of quantum vacuum fields entangled causality is not considered physically dead as usually done in physicalistic physics. Cybersemiotics conceives it as a part of Firstness, which also holds qualia and pure feeling. Although physicist may be bothered by this new metaphysical understanding of this level of reality, they cannot claim that there is no room for new interpretations, because physics has a complete understanding of it. On the contrary, this is one of the most mysterious levels of reality we have encountered, and its implications have been discussed since the 1930's and were central in the disputes between Bohr and Einstein. Now the entanglement is attempted exploited for the possibility of teleportation and the first positive results claimed.
2. The second level of efficient causation is clearly what Peirce describes as Secondness. This realm is ontologically dominated by physics as classical kinematics and thermodynamics. But for Peirce it is also the willpower of mind.
3. The third level of information is where the formal causation manifests clearly and where the regularities and Thirdness becomes crucial for interactions through stable patterns that are yet only protosemiotic. This level is ontologically dominated by the chemical sciences and concepts of pattern fitting. This difference in ontological character may be one of the keys to understand the differences between physics and chemistry. It is not only a matter of complexity but also of organization and type of predominant causality.
4. On the fourth level, where life has self-organized, the actual semiotic interactions emerge. First internally in multi-cellular organisms as 'endosemiotics' and between organism as 'sign games', this framework – based on biosemiotics – points out that the informational concept may be useful at the chemical level of analyzing life, but it is not sufficient to capture the communicative, dynamic organizational closure of living systems. This is one of the reasons why Maturana and Varela do not want to use the information concept in their explanations of the dynamics of life and. But they do not use a semiotic either.
5. Finally on the fifth level with syntactic language games, human self-consciousness emerges and with that rationality, logical thinking and creative inferences (intelligence). Intelligence is closely connected to abduction and conscious finality. Abduction is crucial to signification. It is the ability to see something as a sign for something else. This something else has to be a habit of nature. Some kind of regularity or stability in

nature that the mind can recognize as somewhat lawful is necessary for it to be a fairly stable eigen value in the mind (an interpretant).

The cybersemiotic approach explains this through a semiotized version of Luhmann's triple autopoietic theory of communication combined with pragmatic theories of embodied social meaning.

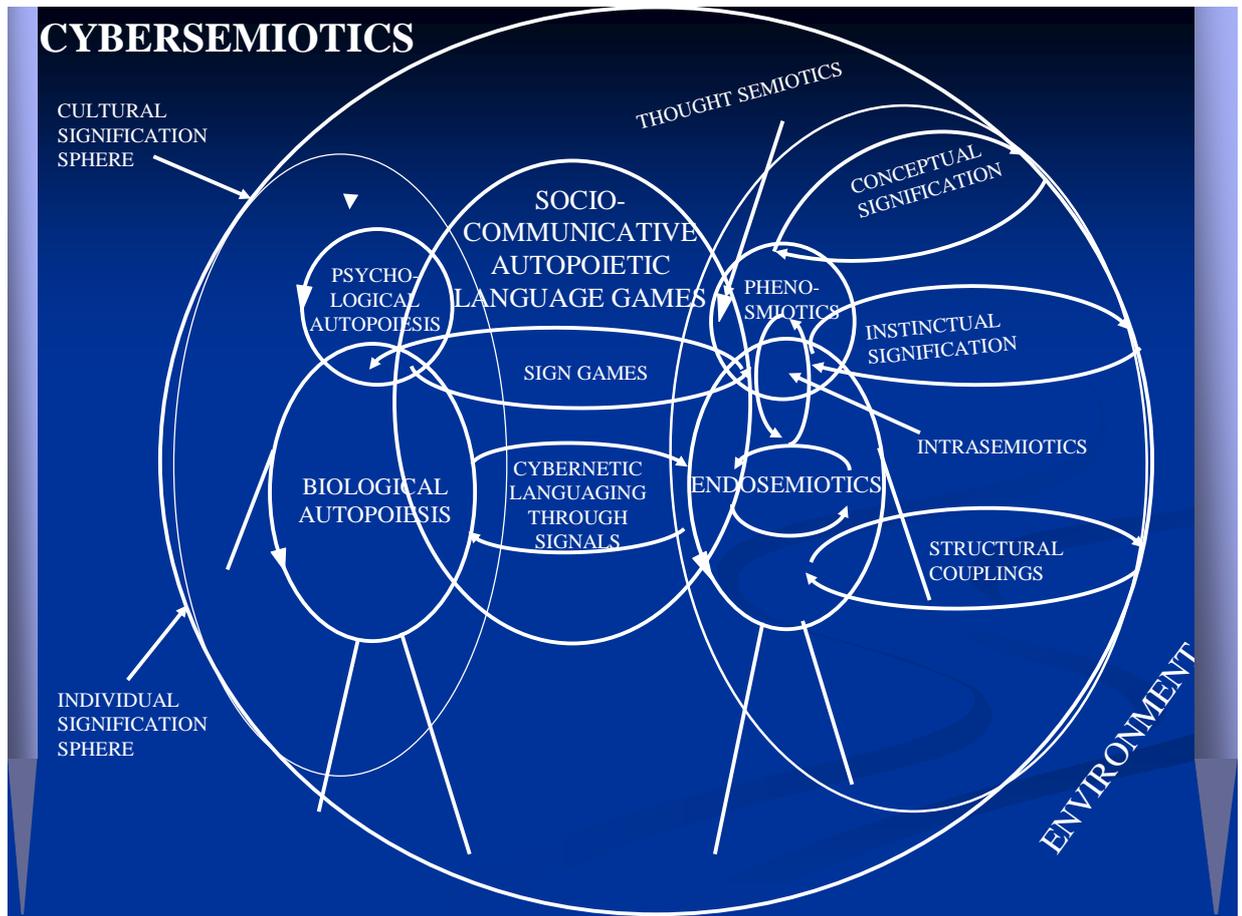


Figure1: Cybersemiotic model classifying different types of semiosis and proto-semiotic processes: The model is a cybersemiotic development of the Luhmann model shown in figure one. The localization of the processes have nothing to do with the actual bodily locations (as the head, for instance, is also a part of the biological autopoiesis), and have endosemiotic processes. To limit the complexity, I have placed all the cybernetic-autopoietic concepts on the left person and all the semiotic ones at the person to the right. But all concepts concern both persons. Each person is placed in a signification sphere. When these are combined through socio-communicative autopoietic language games a common signification sphere of culture is created. One part of ecosemiotics signification is based on the linguistic processes of conceptualization and classifications. Underneath language games is the biological level of instinctually based sign games, and under that, the cybernetic languaging game of the coordination of coordination of behavior (of two black boxes). Thus, ecosemiotics also has a level of bio-

psychological or emphatic signification, as well as a level of structural couplings, which the organism, or rather the species, has developed through evolution. Although the figure does not seem very simplified it is even more so, as it combines several simplified figures. But it functions as a tool to view the relations between the different levels of semiosis. Combining this with a general systems theory of emergence, self-organization and closure/ autopoiesis it constitutes an explicit theory of how the inner world of organism is constituted and therefore how first person's views are possible and as real as matter. This produces a view of nerve cell communication based on a Peircean world view binding the physical efficient causation described through the concept of energy, the chemical formal causation described through the concept of information with the final causations in biological systems described through the concept of semiosis. Developed from Brier (2008a).

Thus semiotic autopoietic social and cultural communicative praxis become the epistemological center of our understanding of ourselves as autopoietic embodied brain-borne self-conscious intersubjective beings situated in language and environment. From this situation we develop knowledge about us self ad conscious being, on society, language and culture to understand out intersubjectivity and about our body hood and finally the environment. These become the four specializing aspects of Wissenschaft.

The four views in the Cybersemiotics star

My theory and philosophy of science is then that in a total naturalism all the four approaches to understand cognition, communication, meaning and consciousness – from exact natural sciences, from the life sciences, from phenomenological-hermeneutic interpretational humanities and from the sociological discursive-linguistic view – are all equally important and have to be united in a transdisciplinary theory of information, semiotics, first person consciousness and an intersubjective cultural social-communicative approach. The model in figure 4 called the Cybersemiotic star below illustrates this. It is also based on that the prerequisite of producing intersubjective knowledge such as Wissenschaft is to accept the reality of language, autopoietic embodied minds, culture and non-cultural environment, while at the same time pointing to that the discussion about transdisciplinary knowledge is done in a semiotic-linguistic discourse with other embodied and linguistically informed consciousnesses in a common praxis in non-cultural and cultural signification sphere. From this interaction springs four main sphere of knowledge interest: 1. The first person knowledge interest of the origin and function of mind and subjectivity in this personal life as the phenomenological investigating of the life world in a Husserlian and Heideggerian phenomenology, which in a Peircean semiotic phaneroscopy become in intersubjective signification sphere. When we are studying socio-communication and acting from the point of language, we are acting in meaningful language studying other meaningful language. As

Wittgenstein (1958) argues that there are no private languages or language games and we can add there are no private sign games either and all knowledge comes through signs. But it is emerging from the center born as an unrestricted absolute naturalism, which makes it impossible for this or any of the other approaches to knowledge to claim that they make a model of all of nature.

In the first person approach, which are usually called phenomenological but which we here with Peirce will call phaneroscopic, we deal with consciousness impressions and expressions as the processes of sense experience and thinking in a state before sciences has divided the world in subjects and objects but still within a triadic semiotics. It is the subjective and intersubjectively shared first person experiential consciousness, as its own first cause, for Peirce semiotically based. Consciousness is not viewed as a product of the brain or of culture and language neither in Peirce or Husserl. All perception is embedded in consciousness in even so rudimentary form as pure feeling in Firstness. There is no theoretical interest in looking for something more original (material) "behind" the semiotically sense experience in a reality of potential signs. To do so one has to redefine the world by splitting it into a subjective and an objective aspect and then concentrate one's investigations on the objective site. This is what science does and in its endeavour it tends to forget the unity, from which it started its epistemological project. In eliminative materialism as well as eliminative informationalism it even denies this original (triadic) unity (or life world), from which it sprang.

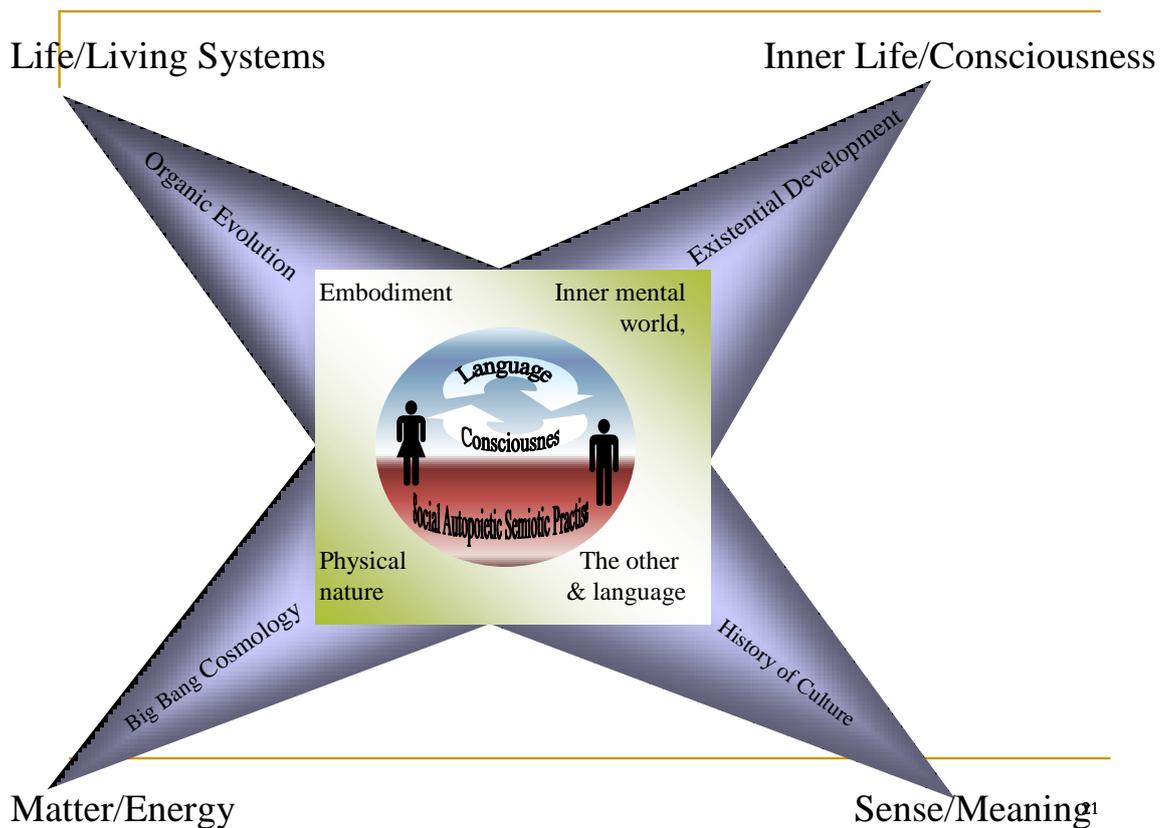


Figure 2: **The Cybersemiotic star**: A diagram of how the communicative social system of embodied minds' four main areas of knowledge arises. Physical nature is usually explained as originating in energy and matter sometimes also information, living systems as emerging from the development of life processes (such as the first cell). Social culture is explained as founded on the development of meaning and power in language and practical habits, and finally our inner mental world is explained as deriving from the development of our individual life world and consciousness, in spiritual and religious framework often ultimately from an objective transcendental spirit or as a soul coming from a personal creator God. But none of them is specifically intended here.

We are thus immersed on conscious communication forms be they verbal or non-verbal. As the linguistic turn argues, we cannot get out of language and thereby culture and power. Even science becomes as social construction, which is historically true, as there as been longer times in culture where we did not have science than there has been with science. Empirical and mathematically grounded science is a rather modern invention that really started in the Renaissance. Scientific knowledge has formed our rationality and cultural outlook on the world up to the global discussion these days about the reality of global warming.

The socio-communicative “sciences” are based on the basic belief that all knowledge is created through intersubjective discourses, which has spawned social constructivistic paradigms believing that we more or less create nature and our view of ourselves through our discontinuous developing discourses. Structuralism and Marxism for instance consider the human subjects as having very little causal effect on human practice that is primarily seen as guided by social and cultural-linguistic patterns and forces.

Peirce’s semiotics has that in common with Critical Rationalism and Critical Realism that it understands that humans create knowledge together in a mixture of language and praxis, but it is not a pure constructivism as it recognises that empirical testing of theories and our own roots through evolution in the self-same reality we are investigating, do have considerable influence on forming the scientific knowledge which is the result of the process.

Though we need the belief in an ultimate truth and have truth as an ethical commitment in Wissenschaft; we are also aware that there can be no final proof of our knowledge being a universal true statement or model. It is as Kant says “a regulative idea”. Thus the model has a constructing movement going one way from the social and phenomenological and on the other hand empirical perturbations from the pragmatic aspect of reality. These two interact through time and make our knowledge system develop to be more and more encompassing.

There are three forms of historical explanations going on : 1. The cosmological, 2. The Biological, 3. The historical. The natural science work towards making this one grand historical explanation, but so far we have not cracked the problem of the emergence of life and consciousness in evolution, so we until that we might have to accept that an all-encompassing explanation of the conscious meaningful human communication process cannot be provided from any of the corners of the model. We cannot reduce our scientific explanations to one grand story, but have to juggle with all four at the same time. Brier, S. (2009a): “Cybersemiotic Pragmatism and Constructivism.” I have connected my view of Peirce’s pragmatism and second order cybernetics and showed how it establishes an alternative to radical constructivism I am drawing on Bhaskar’s (1997 and 98) *Critical Realism*, where he is also inspired by Peirce as well as Marx. Since the publication of his *A Realist Theory of Science* in 1975, critical realism is defending the critical and emancipatory potential of rational (scientific and philosophical) enquiry and is – like Cybersemiotics – offering a real alternative to both positivism and post modernism and is still developing its view.

In establishing a new framework, I also hope to create a third culture, one that transcends the incommensurability between C.P. Snow’s two cultures: science-technology, and the humanities versus social sciences. But so far it has all been about Wissenschaft and in the final part of this article I also want to write a few

points about the relation between *wissenschaft* and other types of knowledge systems like religion, politics and art. I am trying to draw a map onto which a multitude of viewpoints can be plotted and their subject areas characterized and compared with other approaches. By erecting this framework, I hope to expand the dialogue between sciences, the humanities, the social sciences, philosophy, and the existential quest to broaden our concept of reason in accordance with my stance towards making common frames for the open and systematic pursuits of knowledge and meaning.

Towards a third culture

All the above-mentioned insights about language indicate that we are the autopoietic systems in which language emerges. We speak language, but we are also spoken by language. To a great degree, language carries our cultures as well as our theories of the world and of ourselves. As individuals, we are programmed with language – to learn a language is to learn a culture. As such, pre-linguistic children are only potentially human beings, as they have to be linguistically programmed in order to become the linguistic animal cyborgs, we call human. Yet, we do not have to be slaves of that (one culture) since we can learn more languages, and we reflect on common language with specially developed languages, such as scientific or poetic language.

However, getting behind language as such is difficult. Zen Buddhism, for instance, cultivates such techniques through the paradoxes of the koans. Other systems do it by going beyond linguistic meaning in meditation. Members of different religious systems spend long periods in silence and seclusion as a means to expand consciousness beyond language, or maybe to just become more aware of what goes on underneath language in emotions and biological motivations that also are in play behind our linguistic self-consciousness.

I suggest that culture builds up a view of what is real and what is not, what is manifest and what is not. I put these four decisions into a square inspired by Greimas' square¹. We thus start with real phenomena of which some can be handled directly and some are working behind the scenes, such as the laws of nature or animal spirits, invisible and blind watchmakers. See Figure 5.

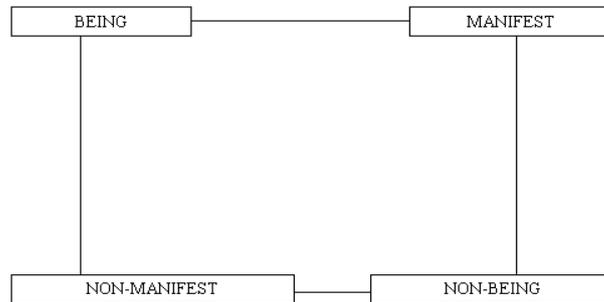


Figure 4: The first circle developed and inspired by Greimas' semiotic square, consists of two pairs of opposites combined. Objects can be characterized by their being and manifestation. True objects have both. Fictional and mythological beings have none. The figures can be found in Brier (2008a).

The real and manifest in our culture are primarily considered to be natural 'things' or 'objects' (res). What is not real and not manifest is the 'no thing' like the Godhead, the emptiness, the empty set, zero, the vacuum field and so on. Manifest cultural objects are not real, like natural objects. They are fictional. This goes for pieces of art and even the architecture of buildings and machines, although the parts they consist of are natural objects or 'matter'. Real non-manifest phenomena, such as the natural laws or the meaning of life are 'hidden'. See Figure 4.

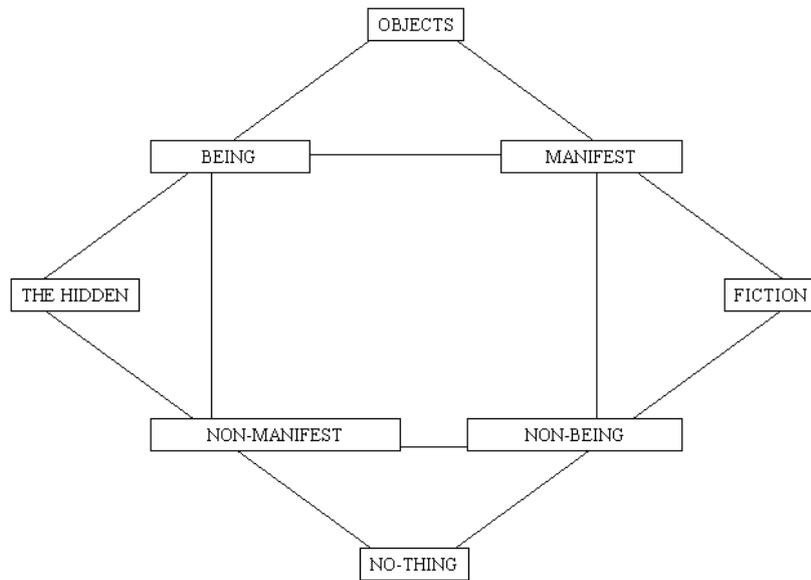


Figure 4: The second circle produces the basic objects in our culture: the real, the fictional, the hidden forces controlling object processes and finally the zero or negative basis for everything that can also be viewed as a fullness of potentialities as Peirce does in his concept of Firstness.

To this construction, we can add some of our basic systems of knowledge construction. Science deals with the hidden laws behind the objects and their dynamics (kinematics for instance). Religion deals with the hidden that is no-thing. Art deals with fictional objects manifest or imaginary. Politics deal with fictional no-thing-phenomena like democracy, human rights, and free markets. See Figure 5.

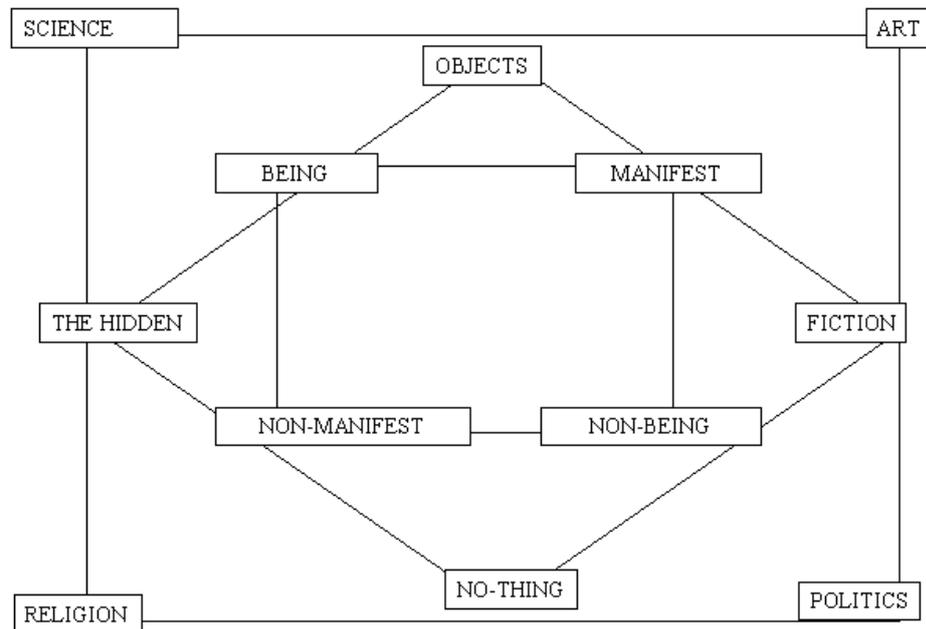


Figure 5: The third circle explains the emergence of different kinds of knowledge types related to the kind of objects our culture defines in the world. They all seem necessary and not reducible to each other. The sciences deal with the hidden order behind the dynamics of objects. Religion deals with the hidden non-material forces and order that some presume govern our existence. Art deals with the production of fictional objects and politics is the creation of a non-material collective of fictional goals like democracy and a sustainable society.

We are developing a Third Culture, which will go beyond that fundamental split which there has been between the world of science and technology and the world of the humanities and the arts. The third culture reveals that science and art share creative aspects. This is why we now increasingly use the term “knowledge production” instead of the discovery of truth or facts. We have come full circle now in our culture after positivism by realizing that both religion and science have metaphysical assumptions or frameworks behind them, paradigms if you like.

We have also learned that our basic attitude of relating to and caring about reality and the living beings in it, as well as our search for meaning and ethics, are fundamental parts of the existentiality of a conscious individual in a body and a culture. The idea is that this non-reductionist cybersemiotic view of absolute naturalism opens up for other knowledge types as necessary complementary views to understand and handle “human knowing”. Among them is the spiritual as it for instance developed by Roy Bhaskar (2002) in his book series *Meta Reality*

and the integral paradigm which Ken Wilber develops and which is expanded on in Sean Esbjörn-Hargens and Michael E. Zimmerman's book: *Integral Ecology: Uniting Multiple Perspectives on the Natural World*. Peirce sees both the core of Wissenschaft and religion as opens forms for the search for truth, beauty and meaning, which complement each other. I have written on this aspect in Brier, S. (2008c), where I compare " Bateson and Peirce on the pattern that connects and the sacred" and in (2008d), where I point to how Peirce's metaphysics establishes a relation between mysticism and science through his panentheism calling it " A Peircean Panentheist Scientific Mysticism". Spirituality is the concept chosen to signify this intentionality that gives rise to political and religious, as well as scientific pursuits.

Finally, arts and politics join forces in our cultural construction of social utopias. Presently, the global ecological as well as human and economically sustainable society seem to be our new utopia, as we worry about our globe's ability to keep the conditions stable for our survival on this planet. See Figure 6.

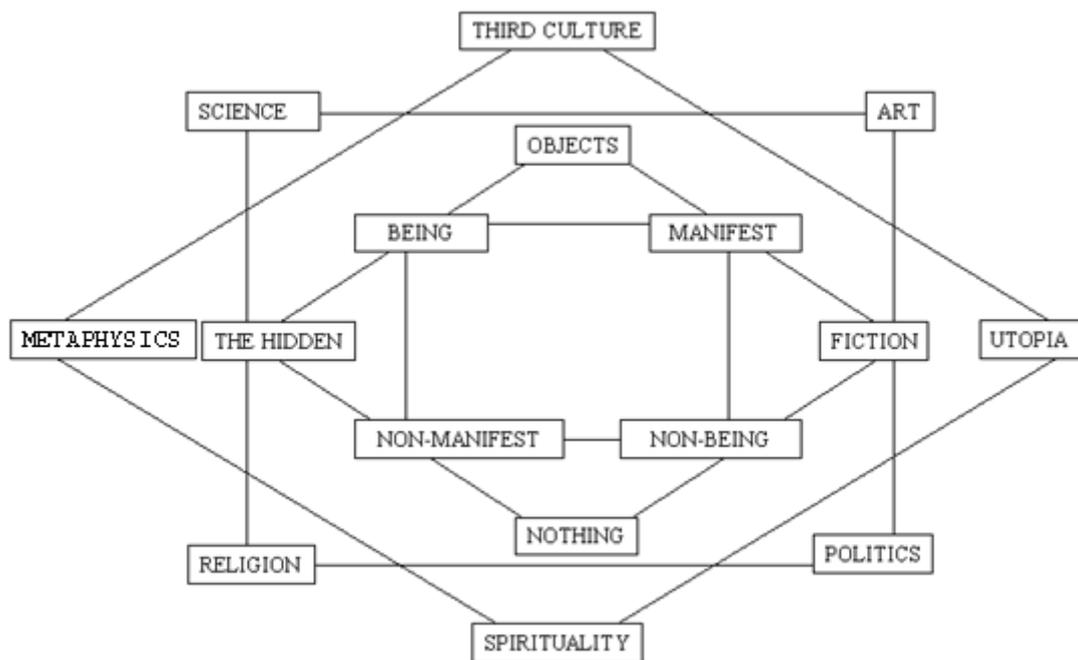


Figure 6: The fourth circle brings forth a reflective practice to analyse and develop the foundation on which our thinking is based. Thus, revision and development are possible. This is one of the very important uses of the philosophy of science.

This way of constructing our human and cultural knowledge system, collecting the four levels, leads to a model like the one shown in Figure 6. It shows how the different knowledge systems interact, bringing forth our ideas of utopias worth pursuing through our political, spiritual, philosophical and scientific systems. The

model is an example of Third Culture as it combines traits from art and science and in itself is somewhat utopian. It is one of many ways to conceptualize these interaction of many types of knowledge systems that we as humans feel an urge to cultivate probably because none of can cover the whole of reality for the simple reason that we ourselves are part of it and therefore cannot transcend it – at least not in words.

As my last words I want to point out that this article gives an overview of many years of work., which is argued at length in my book from 2008 and in papers from 2007 and forward. Here much more elaborate argumentation can be found in these texts as well as in a special issue of *Entropy* on the subject of Cybersemiotics.

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ⁱ This model builds on presentations by Peter Voetmann Christiansen to a Mind Ship Seminar in Copenhagen in 1996 arranged by Tor Nørretranders. Here, the idea that I have further developed was sketched, and with the permission of Peter Voetmann Christensen, I have developed it further.

I wish to thank Peter for this and many other inspirations over the many years he has been my colleague. From Brier 2008a and on I call the model the *Brier-Christensen multiple square*.