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THE WORLD AS SEMIOSIS^{*)}

This paper assumes the perspective of biosemiotics – a new and continuously organizing field in the no man’s land between theoretical biology and semiotics. The term ‘biosemiotics’ was used in Russian semiotic literature by Yuri Stepanov as early as 1971, but did not appear in international literature until introduced by the American linguist and semiotician Thomas A. Sebeok in 1986. It can be conceived of in a wide semantic perspective, as to cover a plurality of possible meanings. In a narrow sense, biosemiotics might be understood as semiotics applied to biology. For instance, in 1963 Sebeok suggested the term *zoosemiotics* to account for the study of animal behaviour (ethology). Enlarging the perspective, the Danish biologist Jesper Hoffmeyer considers that, according to the biosemiotic standpoint,

all processes going on in animate nature at whatever level, from the single cell to the ecosystem, should be analysed and conceptualised in terms of their character of being sign-processes.¹

A concise presentation of his synthetic project reads as follows:

[We] tend to overlook the fact that all plants and animals – all organisms, come to that – live, first and foremost in a world of signification (...). I intend to show how we humans live, like all other animals, plants, protists, fungi, and bacteria within a semiosphere. And that the biosphere must be viewed in the light of the semiosphere rather than the other way around.²

Unfortunately, there is no systematic semiotic theory yet to frame the study of sign processes in biology. For building it the area of sign, operation should be delineated first. Two possibilities came into debate. In the first, semiotics is considered to be coincident with life. In the second, signs

*) 1998-99 Fellow. As his paper was not ready to be published in the yearbook of his series, it was introduced into the present issue.

are seen to pervade the whole universe including inanimate world. The adepts of the former insist that life is qualitatively different from physical-chemical world firstly because it is a semiotic phenomenon. The second vision considers that life emerges in a setting, which is already semiotic in its nature.

Biosemiotics is supposed to frame the alternative to the mechanistic/reductionist/positivist paradigm in biology Darwinism represents a synthesis thereof. For both mechanicism and Darwinism, there are no biological laws or principles to supersede the physical and chemical laws. The existence of such laws is rejected because biological phenomena are considered to be completely described by the fundamental laws of physics and chemistry. According to this view, the essence of life is its chemistry. Instead of considering mechanisms as a class of models for organisms, mechanicism conceives the latter as nothing else but very complex tokens of the former. Therefore, the main way to deal with the organisms according to mechanicism is to engineer them. This belief is backed up by the compelling successes of genetics, biochemistry, and molecular biology a stronghold of nowadays science. In the case of Darwinism, the principle of "natural selection" accounts for the evolutionary process and suffices to explain it. Reformulated in the terms of molecular genetics, Darwin's theory became the synthetic theory of evolution, an apparently unbeatable keep. Biosemiotic challenges this view and completes a list of evidences that shook what Stanley Salthe called the Baconian/ Cartesian/ Newtonian/ Comtean science.³ Thus, the stable image of the world in the Newtonian/ Euclidean paradigm proved long ago to be little more than a particular instance in cosmology. By the time semiotics entered the stage quantum physics had already discarded the myth of the independent observer, and the chaos theory has done the same thing with the illusion of accurate predictability. The emergence of computers and algorithms allowed the simulation of the dynamics of complex systems and of global behaviors. They point to the existence of developmental trajectories that computer simulated evolution is able to rediscover no matter how many times one restart the program and play it again. Because of changes in the scientific paradigm like these, the organicist and developmental perspective in evolution can offer convincing arguments against the dogmas of Neodarwinist orthodoxy. But the promises of biosemiotics as a theory of life exceed the boundaries of biology. It aims to create a unified theory of life, in which *res cogitans* and *res extensa* would no longer be two separated substances, governed

by distinct principles. The biosemiotical approach advocates a deep conceptual remodeling of the traditional Cartesian distinction between two *res*. The philosophical stake of biosemiotics consists in building a bridge between the world of spirit and the world of nature, mind and body, or between *ens rationis* and *ens reale*. Additionally, it would provide the theoretical premise for a praxeology no longer conceived of as domination and efficient manipulation of the ecosystems on behalf of anthropocentric interest, but as fulfillment of the human potential in its lifeworld. This could seal the fate of the distinction between knowledge as accurate representation of nature, determined according to the objective criteria of a rigorous science, and understanding as sign interpretation, where signs are conceived of on the generative model of semiotics.

The forerunner of biosemiotics is the Estonian born German biologist Jakob von Uexküll (1864-1944). In 1926 baron von Uexküll founded the *Institut für Umweltforschung* at Hamburg University where he studied the *Umwelt* or the subjective perception of the world, particularly of the living organisms.⁴ His research program greatly influenced Konrad Lorenz the founder of ethology. Moreover, Uexküll introduced in the study of life phenomena conceptual tools of semiotic relevance. However, he hardly realized this. Uexküll is an “unwitting semiotician”. His contemporary colleagues, skeptical about his biological claims, have dismissed Uexküll’s contributions proclaiming them little more than unscientific expressions of a discredited philosophical current, vitalism. T. Sebeok, along with Thure von Uexküll, an important promoter of his father’s work, have rescued Uexküll from anonymity and oblivion. Uexküll recommended himself as a biologist, yet his studies had a much wider range than biology. He defined it as “the science of the life of plants, animals and human beings”.

Uexküll’s work, *A Stroll through the Worlds of Animals and Men* begins with a seductive description of his research method:

The best time to set out on such adventure is on a sunny day. The place: a flower-strewn meadow, humming with insects, fluttering with butterflies. Here we may glimpse the worlds of the lowly dwellers of the meadow. To do so, we must first blow, in fancy, a soap bubble around each creature to represent its own world, filled with the perceptions it alone knows. When

we ourselves then step into one of these bubbles, the familiar meadow is transformed. Many of its colorful features disappear; others no longer belong together but appear in new relationships. A new world comes into being. Through the bubble, we see the world of the burrowing worm, of the butterfly, or of the field mouse; the world as it appears to the animals themselves, not as it appears to us. This we may call the phenomenal world or the self-world of the animal.⁵

Uexküll uses such examples to clearly contradict those who believe in mechanicism. He finds the description of organisms as mechanisms that use means to be incomplete:

Now we might assume that an animal is nothing but a collection of perceptual and effector tools, connected by an integrating apparatus which, though still a mechanism, is yet fit to carry on the life functions. [...] The proponents of such theories forget that, from the first, they have overlooked the most important thing, the subject which uses the tools, perceives, and functions with their aid.⁶

In all the instances he uses to illustrate his point, Uexküll maintains that an organism is not the simple object to which biologists attempt to reduce it. Beyond *what* an organism is, one needs to wonder *how* it is, namely as a subject. No part of an organism, either complex or simple, should be regarded solely as a mechanism, as the latter implies the presence of an operator:

No single part of the tick's body has the nature of a machine; everywhere operators are at work.⁷

Uexküll's argument is clearly semiotic in nature: an organism transfer not just motion, but stimuli, which involve a perceptive selection on the part of the organism and decision on a course of action. Such operations can only be performed by a subject and are not attributable to objects. Thus any cell that is a part of a subject is in its turn a less sophisticated subject:

[Each] living cell is an engineer who perceives and acts, and has perceptual or receptor signs (*Merkzeichen*) and impulses or effector signs (*Wirkzeichen*). The manifold perceiving and acting of the whole animal may thus be

reduced to the cooperation of all the tiny cells, each of which commands only one receptor sign and effector sign.⁸

Perception and action are two worlds that constitute a single unit the *Umwelt* of the organism, its phenomenal world, or the environment interpreted by the organism that lives in it. By means of anatomical and physiological descriptions, Uexküll puts forth an account of how organisms devise their *Umwelt*. Accordingly, in addition to peripheral receptors and effectors, organisms also have central receptor organs (*Merkorgane*) and central effector organs (*Wirkorgane*), perceptual cues (*Merkmale*) and effector cues (*Wirkmale*), all inter-connected in a functional cycle.

Feelings are representations of the specific receptor signs; they lead to cues or perceptual significations, which constitute the springboard of any action:

All our human sensations, which represent our specific receptor signs, unite into perceptual cues (*Merkmale*), which constitute the attributes of external objects and serve as the real basis of our actions.⁹

The ego-quality is for Uexküll an interpretation, not an object. It represents for instance the unitary manifestation of the cell:

[C]olors are light waves which have become sensations: this means that they are not electrical stimuli, acting on the cells of the cerebral cortex, but the ego qualities of those cells.¹⁰

At any rate, the unity of representations is the subject, the *how* in an organism that cannot be reduced to a *what*.

In Uexküll's scheme, the acting component or the effector cue corresponds to a type of signification that is different from perceptual signification. The interpreter is passive with respect to the former, whereas the latter represents its initiative, as the interpreter responds to the command of some internal program:

[...] the limbs or other organs activated by the separate muscles imprint upon the external objects their effector cue or functional significance [*Wirkmal*].¹¹

Uexküll presents the signifying process as a circular unfolding:

The effector cue or meaning extinguishes the receptor cue or meaning.¹²

The action institutes a new receptor cue, which replaces the former one. Likewise, the interaction between an object and its interpreter takes place as a succession of interactions, as feelings that support the interpretation.

The organism builds its own *Umwelt* by selecting from objects the qualities that correspond to its own structure. Hence, there is a realm beyond the *Umwelt*, in which objects float in indeterminacy. Uexküll calls this phenomenon *Natur*, which is rebuilt by the mind (*Gemut*)¹³ through cues or signs that the *Umwelt* provides. The laws that make the unfolding possible are, in fact, the actual laws of nature:

As the activity of the mind is the only aspect of nature immediately known to us, its laws are the only ones, which may rightly be called laws of nature.¹⁴

Although this equation of law and mind resembles Peirce's Thirdness (described later in the text), Uexküll does not use it for the purposes of an evolutionary narrative. Laws are not laws of development, but only laws of functioning; they organize everything, the world, and the interpreters. Thus, the mind is a stable structure, a given level, and not something to be gradually created by thought:

Our mind (*Gemut*) possesses an inner plan that is revealed only when it is in action. Therefore, the mind must be observed when it is applying itself to the reception and processing of impressions.

Mind in-forms inert matter according to its own structure:

Gestalt (form) is never anything else than the product of a plan within indifferent matter - matter which could have taken shape in some other form.¹⁵

Mind functions in a way similar to how tunes are performed: each *Umwelt* has its own score. In such cosmogonic vision, the study of nature amounts to exposing an already existing system, it reveals the entire symphony. Furthermore, Uexküll does not believe in evolution. Nature for him is the same as it has ever been, a score that allows for melodic combinations:

Imagine that we had a number of living bells, each capable of producing a different tone[...] each living bell would respond to each kind of stimulus with its own "ego-quality (Ich-ton) [...] Chimes composed of living bells must possess the capacity to let their tune resound, not only because they are driven by mechanical impulses, but also because they are governed by a melody. In this manner, each ego-quality would induce the next one, in accordance with the prescribed tone-sequence created by the melody.¹⁶

In *Umwelt* theories, the subject is the passive equivalent of a law that operates trans-individually. Autonomy, then, is merely an illusion: the subject does not act, but is acted upon, just as a key on a piano keyboard does when a score is performed. A predetermined mental structure and principles that have been established beforehand reduce the subjective quality of the interpreter to an epiphenomenon, because they restructure things as if there is no subject proper.

Uexküll put at work body and mind, physiology and cognition, in a meaning generating process. However, after studying his theory neither the link between the body and the subject nor the relation of the latter with the mind (*Gemut*) is clear. Uexküll introduced the subject in the machine but this is not a sound combination. A more comprehensive model able to explain the aforementioned relations is required as long as it is known that the mechanical model has no place for the subject. Moreover, a good model needs to embed *Umwelt* theory into an evolutionary scenario. Biosemiotics aims called to depict it.

A few clarifying remarks regarding the semiotic theory on which biosemiotics is based are necessary in order to distinguish among the existing approaches. In the following, I discuss two of them, the linguistic, and the semiotic.

According to the linguistic approach, known as semiology and founded by Ferdinand de Saussure, language is the most important system of signs and the paradigm of semiotic structure¹⁷. The linguistic approach flourished in France in particular because to some extent it continues with the larger trend of structuralism, and is especially influenced by the linguistic theories of Roman Jakobson and L. Hjelmslev, the *Gestalttheorie* and the anthropology of C. Levi-Strauss.¹⁸ The linguistic tradition in semiotics does not represent a major source of inspiration for the

theoreticians of either global semiosis or biosemiotics. In semiology, the operational domain of the signs is coextensive with the sphere of language. This represents a serious restriction. Moreover, a general theory of signs must describe the generative procedures by which semiosis is able to embody signs. The linguistic approach fails to account for this genetic process.

The other major semiotic tradition comes much closer to this goal. It was originally articulated by Peirce and further developed by Morris in the last century. According to this second approach grounded in a general theory of signs, be they conventional or natural, human or non-human, language is just one among the many signifying and communicating biological systems. The encounter between the semiotic approach and biology took hold in the United States thanks to the work of the group led by Thomas Sebeok. Sebeok's research interests included human non-verbal communication, that is kinetics (concerning gestures and mimicry), proxemics (dealing with the way we interact in space), and zoosemiotics (or the study of symbolic behavior in animals).¹⁹ John Deely, one of the representatives of this trend, believes that generating signs, or semiosis is

an absolutely fundamental process of much larger dimensions, including the physical universe itself — through human semiosis — and considering the semiosis of humanity as part of the semiosis occurring in nature.²⁰

Pondering over the relationship between this way of understanding semiotics and semiology (or linguistic semiotics), Deely claims “semiotics forms a whole of which semiology is just a part”. He further argues that

of course, the topics and objects of I have labeled here ‘semiology’, which means that the texts and themes of literature and linguistically expressed phenomena generally pertain to the order of the so-called *entia rationis*, in the Latin sense of the word. Yet, in the Latin sense, it has also been proved that this field is affiliated with a larger area and is related to a larger object of study—namely the natural environment, as we perceive it.²¹

In order to understand the biosemiotic project it is necessary to accommodate the semiotic concepts to the biological standpoint. The semiotics of Charles Sanders Peirce provides the major inspiration of biosemiotics. In the rather poorly systematized work of the American philosopher one runs across a notion of the sign and a theory of categories

that may together lay the ground for an evolutionary metaphysics. Peirce maintains that, "[I]ts business is to study the most general features of reality and real objects."²² He conceives of the sign as the dynamic structure that always functions as a triad, whereas categories are not just those general concepts through which the interpreter gets to know the world, but rather irreducible properties of being.

The fundamental idea of Peircean semiotics is that the sign is a dynamic triad. In addition to the signifying/signified dyad, the structure of the sign includes a relational third, the interpretant. This is not the same with the interpreter but refers to aspects of the process of interpretation; its nature is never clearly specified by Peirce:

*A Sign, or Representamen, is a **First** which stands in such a genuine triadic relation to a **Second**, called its *Object*, as to be capable of determining a **Third**, called its *Interpretant*, to assume the same triadic relation to its object in which it stands itself to the same object.*²³

Semiosis is the recursive process by which signs are generated. This means that every single instance of the tripartite sign may in turn be considered an object, which calls for further signs:

The triadic relation is *genuine*, that is its three members are bound together by it in a way that does not consist in any complexus of dyadic relations. That is the reason the Interpretant, or Third, cannot stand in a mere dyadic relation to the Object, but must stand in such a relation to it as the Representamen itself does. Nor can the triadic relation in which the Third stands be merely similar to that in which the First stands, for this would make the relation of the Third to the First a degenerate Secondness merely. The Third must indeed stand in such a relation, and thus must be capable of determining a Third of its own; but besides that, it must have a second triadic relation in which the Representamen, or rather the relation thereof to its Object, shall be its own (the Third's) Object, and must be capable of determining a Third to this relation. All this must equally be true of the Third's Thirds and so on endlessly.²⁴

One might legitimately ask what is the role of object in semiosis and where does it stand? It looks like the object opens endlessly in a network of sign-relations, which represent it. It is thereby delocalized because an interpreter never grasps the object itself but only produces a sign of it, a representation. What makes the interest of biosemiotics is exactly the process by which the object is represented. The interpretant turns the relation of the sign with its object into a dynamic in which the sign points to the object and the object recruits more signs. Starting from this dynamic biosemiotics aims to explain evolution as semiosis, i.e. as a process, which obviously has an object.

Besides the triad of the sign, Peirce also identifies three modes of being as they appear to the mind, namely Firstness, Secondness, and Thirdness.

(...) we can directly observe them in elements of whatever is at any time before the mind in any way. They are the being of **positive qualitative possibility**, the being of **actual fact**, and the being of **law** that will govern facts in the future.²⁵

These three categories are seen as irreducible to one another, although each of them entails the other. On Peirce's interpretation, quality would correspond to Firstness, actuality to Secondness, and Law to Thirdness. Peirce further identifies them in different circumstances and phenomena but makes no attempt to a systematic classification thereof. In *The Architecture of Theories*, Peirce explicitly tries to establish the three categories as a ground for a "Cosmogonic Philosophy".²⁶ Here is one of his most quoted paragraphs on this matter:

The origins of things, considered not as leading to anything, but in itself, contains the idea of First, the end of things that of Second, the process mediating between them that of Third. (...). Chance is First, Law is Second, the tendency to take habits is Third. Mind is First, Matter is Second, Evolution is Third.²⁷

It is difficult to understand, for instance, how First and Firstness relate in the above paragraph. Despite that, many authors try to find here the

philosophical root for a semiotic scenario of cosmogony, which might be developed, in a subsequent cosmological one. The concept of Thirdness is particularly attractive. Peirce conceives of law and mind as aspects of Thirdness conceived of as a Janus faced category.

The third category of elements of phenomena consist of what we call laws when we contemplate them from outside only, but when we see both sides of the shield we call thoughts.²⁸

For Peirce the junction between these two aspects of Thirdness is unavoidable. He claims that “[Law] is par excellence the thing that wants a reason”.²⁹ One is only a step away from stating that Law *is* reason. Yet, Peirce does not explicitly take this step. One of his goals is to argue properly for a law of nature. Therefore in the *Architecture of Theories* he launches an attack against the mechanical concept of law, which he deems incorrect on the one hand because it cannot be justified, and on the other hand because mechanical law is incapable to account for evolution. The latter is clear in Peirce’s refutation of Herbert Spencer’s pro-Darwinian theory, which was premised on a mechanical notion of the law:

Mr. Herbert Spencer wishes to explain evolution upon mechanical principles. This is illogical, for four reasons. First, because the principle of evolution requires no extraneous cause, since the *tendency of growth* can be supposed itself to have grown from an infinitesimal germ *accidentally* started. Second, because law ought more than anything else to be supposed a result of evolution. Third, because exact law obviously never can produce heterogeneity out of homogeneity; and arbitrary heterogeneity is the feature of the universe the most characteristic. Fourth, because the law of the conservation of the energy is equivalent to the proposition that all operations governed by mechanical laws are reversible.³⁰

Hence, Peirce asks for a law that would be able to surpass the flaws of mechanical law in order to function as a generating principle for evolution. A law such as this would be able to expand and produce through its action all regularities in the universe, the laws of nature, as well as other regularities that do not have the acknowledged rank of a law. However, he considers that such a law should not require another explanation besides mere haphazard. Peirce describes its emergence in a cosmogonic narrative:

This feeling, sporting here and there in *pure arbitrariness*, would have started the germ of a **generalizing tendency**. Its other sportings would be evanescent, but this would have a growing virtue. Thus, the **tendency to habit** would be started; and from this, with the other principles of evolution, all the regularities of the universe have been evolved.³¹

For Peirce, feeling and matter complement each other in **perception/representation**:

[It] would be a mistake to conceive of the psychical and the physical aspects of matter as two aspects absolutely distinct. Viewing a thing from outside, considering its relations of action and reaction with other things, it appears as matter. Viewing it from inside, looking at its immediate character as a feeling, it appears as consciousness.³²

To explain why a seemingly purely mechanical system, a living protoplasm, has feelings, Peirce endows matter as it is perceived with a certain degree of "mind" and "feeling".

Physical events are but degraded or undeveloped forms of psychical events³³ (...) what we call matter is not completely dead, but is merely mind hidebound with habits.³⁴

Physical events are governed by laws much less versatile than mind. Peirce considers laws of matter just lower rank instances of mind.

This hypothesis might be called materialistic, since it attributes to mind one of the recognized properties of matter, extension, and attributes to all matter a certain excessively low degree of feeling, together with a certain power of taking habits. But it differs from materialism in that, instead of supposing mind to be governed by blind mechanism, it supposes the original law to be recognized law of mind, the law of association, of which the laws of matter are regarded as mere special results.³⁵

To recapitulate, Peirce's law of mind is not only a habit in itself but it also manifests as a tendency, which generates habits. Hence, we can infer that Thirdness has produced all the habits, which govern material

world, all the particular laws. Conceived as such it is the kind of law able to account for the evolution of Universe. Moreover, Thirdness acts both within and through the interpreter (being mind law and association law as well). It links inside with outside, subject and object as in a Moebius strip.

“Natural selection” is the driving force in evolution according to Darwinism. It is usually formulated as “survival of the fittest” and it represents the pressure by which environment acts upon organisms. The best adapted of them survive and reproduce giving birth to new individuals who will continue the lineage. Because the conditions which shape a species or another are considered purely contingent there are minute chances for evolution if restarted to rediscover the same phylogenetic paths and to produce similar forms of life. Species emerge from the specificity and complexity of a given context and there is no driving force described to direct development other than natural selection. As long as evolution is not predetermined, the contexts are not repeatable and species represent nothing but fortunate historical accidents. However, despite its stronghold scientific establishment Darwinism fails to explain convincingly the origin of species. It proposes a single mechanism to account for both macro-and microevolution,³⁶ which is validated only for the second kind of event.³⁷ Recently, the advances in computer science gave a boost to a new trend in evolutionary biology, i.e. developmentalism. However, there are biological evidences able to sustain this trend as well. Developmentalism deals with evolution from the standpoint of the dynamic of complex systems. As opposed to Darwinism it points to the existence of robust, i.e. physically stable forms and developmental trajectories, which are very probable to occur during the evolution. These robust forms are dynamic patterns of the architecture of living that probably govern all physical and chemical processes pertaining to life. Biosemiotics tries to tune its concepts with this theory but it doesn't rely only on physical, mathematical, and computational explanations mainly because there is no place for a subject in developmental theory either.

The biosemiotic alternative to Darwinism is centered by the proposed existence of an “object” that works as an attractor of evolution. One of

the tenets of semiotics is the non-coincidence of sign and object. The object exists but is never present. This absence has to be considered according to its very temporal meaning. In this respect, only the sign is really present. The object is *represented* by the sign, which stands for it. A difficult task for semiotics is to reformulate this sign-object relation in order to apply it to a cosmic scale. Indeed, if the entire evolution unfolds can be seen as semiosis, there should be an object that the evolutionary process represents. If one takes everything in the universe as a sign, then the existence of a reality beyond signs is necessary. I wish to return to Peirce's categories in order to explore the way the semiotic object may be conceived of. He defines Firstness as as "pure qualitative possibility" or as "the mode of being which consists in its subject being positively such as it is regardless of aught else."³⁸ Peirce chooses his examples from the sphere of sensations and feelings, which he also calls "qualities of feeling"³⁹:

The first [category] comprises the qualities of phenomena, such as red, bitter, tedious, hard, heartrending, noble.⁴⁰

On the other hand, even though qualities are defined as sensations, their being is conceived of independently of the mind and the sensations:

It is not anything which is dependent, in its being, upon mind, whether in the form of sense or in that of thought.⁴¹

So, he illustrates it by saying

[that] the quality of red depends on anybody actually seeing it, so that red things are no longer red in the dark, is a denial of common sense.⁴²

It is with respect to this that Peirce presents us with his wider philosophical conception:

[That] quality is dependent upon sense is the great error of the conceptualists. That it is dependent upon the subject in which it is realized is the great error of all the nominalistic schools.⁴³

He seems to see the qualities floating in indeterminacy in their determinate form before any interpreter was there to determine them. In a different place, when he describes the ground of understanding Peirce states:

[the] form under which alone anything can be understood is the form of generality, which is the same thing as continuity.⁴⁴

Here generality is to be understood as the equivalent of continuity. Continuity has its own definition:

A true continuum is something whose possibilities of determination no multitude of individuals can exhaust (...).⁴⁵

and

[...] and continuity is the absence of ultimate parts in that which is divisible.⁴⁶

Peirce derived this conception from the study of topology; later in life, he considered his own philosophy based on a doctrine of continuity, which he called *sinechysm*. *Sinechysm* explains why there is no absolute knowledge. There are only points of view, frameworks in the continuum that can be constantly amended, because knowledge is fallible. Peirce does not allow the existence of an ultimate reality of “pure ideas”. He claims that there is a perfect continuity from which reality emerges in accordance with a certain perspective:

The principle of continuity is the idea of fallibilism objectified. For fallibilism is the doctrine that *our knowledge* is never absolute but always swims, as it were, in a continuum of uncertainty and of indeterminacy. Now the doctrine of continuity is that *all things* so swim in continua.⁴⁷

In his short cosmogonic story, Peirce presents a notion of the reality from which the universe allegedly emerges: “It is the germinal nothing, to which the whole universe is involved and foreshadowed. As such, it is absolutely undefined and unlimited possibility - boundless possibility.”⁴⁸ This paragraph contains a paradox. Universe is “foreshadowed” in its “absolutely [...] undefined possibility”. “Boundless” and “undefined” suggest complete indetermination, while the idea of “foreshadowed”

implies the opposite. We have two perspective of what the semiotic object may be. On the one hand in itself (in its virtual existence) is determined and depends on no interpreter. On the other hand, for a given interpreter it always floats in indeterminacy. The space of possibilities is unlimited and boundless but also it is not isotropic (the whole universe is foreshadowed in it – it harbors the structure of it).

As we previously suggested, the realm of the object is always *in futuro*, it is virtual, while the sign stands in actuality. Furthermore, the object is by its very nature a potential being which always underscores the bounded actuality of the sign. The terminology suggested by David Bohm⁴⁹ might be used to describe the differences between the realm of the sign and the realm of the object. The richness and the fuzziness of the object characterize the *implicate* (or enfolded) order of the virtual domain. In actuality, this order unfolds into the realm of sign, which is *explicit* (or unfolded). By the sign generating activity, semiosis *unfolds* the first order into the second. The term enfolded suggests that the object contains all the possibilities out of which only a replica becomes actual as a sign of it. It is like projecting a multidimensional object in a three dimensional world.

Time should be conceived of as the dimension that separates the existence of sign from the existence of its object. In addition to these two poles semiosis, which is a relation, implies a third. Hence, Thirdness should be considered the process that mediates between the sign and its object. In this respect, the arrow of time points to the *enfolded* order thereby confirming its role of attractor in the semiotic unfolding. Time translates causality. Because in interpreter cannot experience at once and directly the wholeness of the object time (and Thirdness) unfolds it in a sequence of signs. "Causality acts tautologically as time."⁵⁰ In line with the semiotical model we present here, time represents a dimension of the interpreter. It both relates and separates the interpreter's potential or implicate order from his actual one. What we called implicate, enfolded, or virtual order is unfolded temporally by and through the interpreters. In order to explain how this process takes place, we must reject the trivial image of time as a one-dimensional guiding string. What we continuously perceive as having one dimension is only the time as it is given in our experience. Time as future existence should account for the complexity of the objects in their enfolded realm.

A first step to understanding Peirce's categories in semiotic context would be to consider them not as disparate but as the constituents of the

interpreter. The three categories might be viewed as distinct but inseparable modes of being: Firstness – as the domain of private experience, the world given in the being of the interpreter (similar to Uexküll 's description of the *Umwelt*); Secondness – as the presence (embodiment) of the interpreter in the world; and Thirdness - as the process (the relational being) which relates the interpreter to the world and the world to the interpreter as well.

This triadic architecture of being might not raise objections when applied to a human interpreter. However, the difficulties become apparent when one attempts to place these categories and the interpreters themselves into a semiotic scenario of evolution. The following question immediately comes to the mind: what is and what is not an interpreter? Is a bacteria for instance, an interpreter proper? Science knows fairly well *what* bacteria are. What it does not know is *how* they are. Actually, since we cannot live their experiences, we hardly know *how* other people are. But we assume. Biosemiotics transfers this kind of assumption over to other living creatures.

Peirce's idea that law and mind are only aspects of Thirdness builds a bridge across two allegedly separate realms. If this is true, where there is law there should also be some sort of a mind. Obviously, law is everywhere. Therefore mind should be present everywhere as well. But what kind of mind exists in lifeless cosmos? Peirce suggests that it would be a "[M]ind hidebound with habits". But, if mind and law are everywhere, and if the three categories are inseparable, then interpreters are also everywhere. And if the realm of semiosis extends beyond life's margins, so do the interpreters.⁵¹ It means that according to this semiotic view an interpreter is not only a human being or the living protoplasm of a cell, but also an ecosystem and even what we generally call a physical system as a creek flowing past the rocks. Hence, a theory concerning organizational levels and semiotic thresholds should be developed in order to distinguish the interpreters according to their rank. Another aspect concerning rank and time must be pointed here. Interpreters are not always operating and interacting at the same level of organization (complexity) but rather some are nested in others. We are nested in a society, animals and plants are nested in ecosystems, our cells are nested in us. In the same way, the time of the interpreters is nested as well. For instance, our time is nested in the astronomical time of the Earth. The time of our cells is nested in ours.

It seems appropriate to resume the discussion of Thirdness by approaching a fundamental but also controversial concept of the evolution theory: the emergence.⁵² The controversy over the status of emergence corresponds in philosophical terms to the dispute between realism and nominalism. An organizational level is considered to emerge from the dynamic complexity of an inferior level so that evolution is defined as a hierarchy of levels. The question that arises is: are these organizing levels really existing in nature? The reductionist approach on this matter is based on the refusal to grant existence to the organizing levels. Many physicists, and unfortunately most biologists think that the material foundation of the world is the only thing which counts and that the entire architecture of existence emerges from it. Scientists share the ideal of unifying the laws of physics and hope that when they reach it, the reconstruction of the world will become possible. A study of emergence realized by three biosemioticians advanced the idea that from the standpoint of realistic ontology emergence may be regarded as a unique law of nature. Epistemologically, however, they consider unification of laws an illusion:

If ontologically interpreted, then emergence will characterize the one and only 'creative force' in the whole universe, and if epistemologically interpreted, it will be a name designating a large scope of various and perhaps very different types of processes.⁵³

The ontological argument entails that, in a way, the levels of organization exist from the very beginning, if not in actuality, at least potentially. The same researchers mentioned above find in this argument support for a notion of final causality, and hence judge it as "an argument of an uncanny Munchausen flavour". Thus

[the] only solution is that all levels and entities exist potentially from the beginning – and what is more, exerting their potentiality as some kind of "cause" before realized themselves, in short you have a constitution of levels presupposing that the next level already exists.⁵⁴

Peirce was aware that evolution needs a growing principle when he deconstructed Spencer's attempt to legitimate Darwinian thought. Therefore, he devised a law that has the ability to construct laws. A sort of crane, as some evolutionary biologists would say. But how did this

law appear? We don't have the grounds to ascribe such a systematic build-up to mere chance.

As an alternative, we suggest that Thirdness functions as an enfolding/unfolding principle, which enfolds in virtuality (the future order of Thirdness) and unfolds in actuality (the present order of Thirdness). Moreover, what Peirce called "the tendency to take habits" should be understood as Thirdness' intrinsic capacity to generate laws (legisigns). These laws or habits are mere signs whose object is Thirdness itself. In this respect, he regarded Thirdness as "the law of association, of which the laws of matter are regarded as mere special results."⁵⁵ As evolution proceeds, new laws emerge. Where do they come from? On the interpretation we suggest, the laws come out from the "implicit body" of Thirdness. This is another way to state that "evolution 'discovers' the most favorable paths of construction"⁵⁶ Furthermore, the legisigns (particular instances of laws or habits according to Peirce) establish semiotic relations among them. These relations reflect the "the generalizing tendency" that Peirce considered to be the direction of evolution.

The unfolding semiosis is different from a purely algorithmic process. This is because Thirdness is not understood as a separate causal agent who acts on its own. Nor is it merely another law. In the proposed semiotic understanding, the three categories cannot exist or act separately. They are all linked in the causal circuit by the way each one influence the others. Categories don't act one upon another. They are reflected one into another. This implies that the agents of semiosis are interpreters proper, and not automata. What conceptually differentiates interpreters from automata is the presence of Firstness in their model of being. Moreover, what for an automaton is error and haphazard, for the interpreter is in-built semiotic freedom. I refrain from a discussion of freedom here in order to refer to the problems raised by what Peirce understood by fallibility. The semiotic causal entailment involves all the categories. Semiosis begins when an external agent acts upon the interpreter. It involves an interaction at the level of Secondness, and a series of processes (Thirdness) through which this interaction translates at the level of Firstness. In Uexküll's model, the sign at the level of Firstness is a perceptual cue (Merkmal) or a receptor sign. To illustrate this idea, he chooses the example of a human interpreter:

All our human sensations, which represent our specific receptor signs, unite into perceptual cues (Merkmale) [...] and serve as the real basis of our actions.⁵⁷

These receptor signs are not regarded as simple epiphenomena of cognitive processes but as the very ground for action. A second branch of semiosis generates effector signs:

[...] the limbs or other organs activated by the separate muscles imprint upon the external objects their effector cue or functional significance [Wirkmal].⁵⁸

In this case, the semiotic triad is launched from the standpoint of Firstness, is mediated by Thirdness, and gets externalized at the level of Secondness as an effector sign.

Let us take the case of the interpreter embedded in his *Umwelt*. There are two realms in which the interpreter exists: in the enfolded realm he exists as a potential, while in the unfolded realm he actualizes the potential. Obviously, these two realms or levels are temporally disjoined. As the interpreter advances in time, he both represents and consumes his potential. Meanwhile, he interacts horizontally with other interpreters at the level of Secondness. The interaction between the interpreter and his surroundings can be modeled by using a semiotic triad: a semantic field which communicates itself to the interpreter in its Firstness, a symbolic reality which reconstitutes this field as the interpreter's *Umwelt* and a pragmatic attitude by which advancing in its surroundings (the semantic field) the interpreter recomposes it as the *Umwelt*. In a biological context, the so-called semantic field is unfolded in the objects constituting the ecological niche of an organism. As it advances in its environment, the organism leaves its mark on objects, *informs* them. Through their response, the objects in turn *inform* the organism that initially acted on them. The *Umwelt*, as the symbolic reality of an interpreter, participates in any initiative of the latter. The effect of the action of the interpreter returns to him a reaction of environment, which remodels the symbolic reality thus further structuring the *Umwelt*. The evolutionary character of semiosis is triggered by the fact that the organism and its surroundings can shape each other. Semiosis does not function just as the initiative of an interpreter upon another interpreter, which the former mechanically

launches against the latter. Nor does it take the form of the reception of an action in the quality of a feeling, at the level of Firstness. If this is what all comes down to, growth would be impossible: all actions remain just actions, and all feelings remain feelings in an eternally present time. Interactive interpreters co-evolve through their interpretive acts, structuring themselves beyond mechanical interactions and feelings.

In between receptive and effector semiosis, Uexküll places an aggregate of a priori given schemata. However, a semiotic solution requests a different elaboration. Semiosis is at home especially here. The triad of categories we considered to pertain to an interpreter can be used as a model in cognitive science. Here is how the cognitive psychologist Ray Jackendoff reformulates it:

The upshot is that psychology now has not two domains to worry about, the brain and the mind, but three: the brain, the computational mind, and the phenomenological mind. Consequently, Descartes' formulation of the mind-body problem is split into two separate issues. The "phenomenological mind-body problem" [...] is, How can a brain have experiences? The "computational mind-body problem" is, how can a brain accomplish reasoning? In addition, we have the mind-mind problem, namely, what is the relationship between computational states and experience?⁵⁹

In accordance with the Peircean vocabulary, the phenomenological aspect is identified with Firstness: neither mind, nor brain. The study of the relationships between the three mentioned aspects is stated here as three dyads, not as a genuine triad.

The phenomenalist mind, also known as Qualia, is

an unfamiliar term for something that could not be more familiar to each of us: *the way things seem to us*.⁶⁰

This is how the cognitive philosopher Daniel Dennet illustrates it:

Look at a glass of milk at sunset; the way it looks to you – the particular, personal, subjective visual quality of the glass of milk is the quale of your visual experience at the moment. The way milk taste to you is another, gustatory quale, and how it sounds to you as you swallow is an auditory quale.⁶¹

Dennet tells *how* Qualia is but he insisted to say that there is no *what* Qualia is made of:

You enter the brain through the eye, march up the optic nerve, round and round the cortex, looking behind every neuron, and then before you know it, you emerge into the daylight on the spike of a motor nerve impulse, scratching your head and wondering where the self is.⁶²

Jackendoff believes that

conscious awareness is caused by/ supported by/ projected from information and processes of the computational mind.⁶³

Actually, Dennett has refuted a possible semiotic stance from a strictly materialistic standpoint, by dismissing Qualia on the ground that they cannot be identified in any objective mode of being of the mind. The relevance of this kind of interpretation can be rediscovered in the debates on artificial intelligence, concerning the question whether an artificial intelligent do experience Qualia. The hypothesis is that computers might experience Qualia because it most probably arises from the complexity of the processes inside the machine in the same way it comes out from the cortical processes.

Let us review the main points of our semiotic model. Semiosis as sign generating activity is a universal interpreter-operated process. An interpreter is the three-tiered being that lives at the intersection of two realities, the implicate and the explicit. Operating and being operated by Thirdness, he advances both in the world and along its own time. The interpreters are the actors that bring what is potential to actuality in a semiotic unfolding. They are "attracted" in their own virtuality. However, the way towards their own potential passes through the interaction with other interpreters. The inward and the outward way that relate the interpreter to the world is its own Thirdness. According to the semiotic screenplay, Thirdness covers a paradox. It is both the enfolded and the one that unfolds, but in different temporal orders. This category shares the nature of time. Time and Thirdness act tautologically. However, if time irreversibly flows into one direction, Thirdness permanently moves in and out of itself. In an out of time order, probably remaning always the

same, within the temporal frame unfolding itself in signs of increasing generality.

Trying to end this paper, we are aware that the attempt to explain the origins of semiosis is nothing but semiosis. Our approach is born out of its own matter much in the same way as the workings of Thirdness.

NOTES

- 1 In *Encyclopedia of Semiotics*. P. Bouissac (editor.), Oxford University Press, 1994, pp. 82-5.
- 2 Jesper Hoffmeyer, *Signs of Meaning in the Universe*, Indiana University Press, 1996, pp. vi-vii.
- 3 Stanley Salthe, *Development and Evolution - Complexity and Change in Biology*, The MIT Press, Cambridge, Massachusetts, 1993, p. 1.
- 4 Jacob von Uexküll, "A Stroll through the Worlds of Animals and Men" in *Semiotica*, Special Issue, 89-4, 1992, p. 279.
- 5 Idem, p. 319.
- 6 Ibidem, p. 319-20.
- 7 Ibidem., p. 322.
- 8 Ibidem, p. 322-3.
- 9 Ibidem, p. 323.
- 10 Jacob von Uexküll, "The Theory of Meaning" in *Semiotica*, 42/1, 1982 [1940], p. 45. Apud Jesper Hoffmeyer, *Signs of Meaning in the Universe*, Indiana University Press, 1996, p. 55.
- 11 Jacob von Uexküll, "A Stroll through the Worlds of Animals and Men" in *Semiotica*, Special Issue, 89-4, 1992, p. 323.
- 12 Ibidem, p. 324.
- 13 Thure von Uexküll interprets the meaning of *Gemut* in his father's work in *Semiotica*, Special Issue, 89-4, 1992, p. 311: "Uexküll understands by *Gemut* the synthetic function of apperception which combines the signs to form larger entities. It constructs the surrounding-world of the living being in its spatial and chronological organization and fills it with objects made up of organizing signs and content signs, and which are linked together by schemata."
- 14 Jacob von Uexküll, "Theoretische Biologie", Rpt. of Second edition of 1928, Frankfurt a. M.: Suhrkamp, 1973. Apud "Introduction: The Sign Theory of Jacob von Uexküll" in *Semiotica*, Special Issue, 89-4, 1992, p. 281.
- 15 Ibidem, pp. 282-3.
- 16 Jacob von Uexküll, "The Theory of Meaning", *Semiotica* 42/1, 1982 [1940], p. 45 apud Jesper Hoffmeyer, *Signs of Meaning in the Universe*, Indiana University Press, 1996, p. 55.
- 17 Oswald Ducrot, Jean-Marie Schaeffer, *Noul dicționar enciclopedic al științelor limbajului (The new encyclopedic dictionary of the sciences of the language)*, Babel Publishing House, Bucharest, 1996, p. 141.
- 18 Idem, p. 145.
- 19 Ibidem, p. 144.
- 20 John Deely, *Bazele semioticii (The Basis of Semiotics)*, translation altered, All Publishing House, Bucharest, 1997, p. 5.
- 21 Idem., p. 6.

- 22 Charles Sanders Peirce, "The Approach to Metaphysics" in, *Philosophical Writings of Peirce*, Justus Buchler (editor), Dover Publications, New York, 1955, p. 314.
- 23 Charles Sanders Peirce, *Collected Papers*, 2.227-9.
- 24 Idem.
- 25 Charles Sanders Peirce, "The Principles of Phenomenology" in *Philosophical Writings of Peirce*, Justus Buchler (editor), Dover Publications, New York, 1955, p. 75.
- 26 Andrei Marga, *Reconstrucția pragmatică a filosofiei (Pragmatic reconstruction of philosophy)*, Polirom Publishing House, Iasi, 1998, p. 168.
- 27 Charles Sanders Peirce, "The Architecture of Theories" in *Philosophical Writings of Peirce*, Justus Buchler (editor), Dover Publications, New York, 1955, p. 323.
- 28 Charles Sanders Peirce, "The Principles of Phenomenology" in *Philosophical Writings of Peirce*, Justus Buchler (editor), Dover Publications, New York, 1955, p. 78 .
- 29 Charles Sanders Peirce, "The Architecture of Theories" in *Philosophical Writings of Peirce*, Justus Buchler (editor), Dover Publications, New York, 1955, p. 318.
- 30 Idem, pp. 318-319.
- 31 Ibidem, p. 323.
- 32 Charles Sanders Peirce, "The Law of Mind" in *Philosophical Writings of Peirce*, Justus Buchler (editor), Dover Publications, New York, 1955, p. 353.
- 33 Ibidem, p. 353.
- 34 Ibidem, p. 350.
- 35 Ibidem, p. 353.
- 36 Microspeciation involves changes within a species which results in different varieties of that species. Macroevolution is used to refer to any evolutionary change at or above the level of species. It means the splitting of a species into two or the change of a species over time into another (anagenesis, not nowadays generally used). Any changes that occur at higher levels, such as the evolution of new families, phyla or genera, is also therefore macroevolution, but the term is not restricted to the origin of those higher taxa.
- 37 In a genetic framework diversity is produced by random genetic alteration (due to recombination by mating or to mutation) which are kept or discarded (along with the individuals) according to their impact upon survival.
- 38 Charles Sanders Peirce, "The Principles of Phenomenology" in *Philosophical Writings of Peirce*, Justus Buchler (editor), Dover Publications, New York, 1955, p. 76.
- 39 Idem, p. 80.
- 40 Ibidem, p. 77.
- 41 Ibidem, pp. 84-5.

42 Ibidem, p. 85.

43 Ibidem, p. 84.

44 Charles Sanders Peirce, "Synechism, Fallibilism, and Evolution" in *Philosophical Writings of Peirce*, Justus Buchler (editor), Dover Publications, New York, 1955, p. 355.

45 Idem, p. 355.

46 Ibidem, p. 355.

47 Ibidem, p. 356.

48 Charles Sanders Peirce, *Collected Papers*, 6.217.

49 David Bohm, *Wholeness and the implicate order*, Routledge & Kegan Paul, London and Boston, 1980.

50 Andre Scrima, *Timpul rugului aprins (Time of the Burning Bush)*, Humanitas Publishing House, Bucharest, 2000, p. 92.

51 It seems exaggerated, indeed, for the agents of an entire reign, i.e. the mineral reign, to be considered interpreters proper. Many biosemioticians share the idea that semiosis is not operational in the inanimate world. For them physical and chemical laws suffice to explain what is generally considered a pure physical/ chemical world. According to the biosemiotical mainstream, a semiotic threshold seems to separate life from the lifeless universe. The biosphere and the semiosphere coincide. The origins of semiosis can be traced back to the origins of life. However, this belief cannot be convincingly sustained in the biological debate. Many times semiotics challenges terminology only to leave the old conceptual structure intact. Physico-chemical reductionism continues to dominate the interpretation of biological phenomena. Unfortunately, no matter how tired of reductionism theoretical biologists are, the need for a radical semiotical approach is still faced with reserve. Running against the dogmas of neodarwinian evolutionism is risky. However, biosemiotics takes the risk anyway for it has no choice but either to be ridiculed by the scientific establishment as an outdated way of thinking, or to succumb to its inner fallacies.

52 The phenomenon, caused by multiple interactions among various agents, and leading to a global behavior irreducible to simple interactions and qualities of the ensemble, which in their turn are irreducible to the qualities of the agents, is known as emergence.

53 Claus Emmeche, Simo Koppe, Frederik Stjernfelt, "Towards An Ontology Of Levels" in *Journal for General Philosophy of Science*, 28, 1997, pp. 83-119.

54 Idem, pp. 83-119.

55 Charles Sanders Peirce, "Synechism, Fallibilism, and Evolution" in *Philosophical Writings of Peirce*, Justus Buchler (editor), Dover Publications, New York, 1955, p. 353.

56 The new insights into the science of complexity unveil the existence of some principles which evolution is prone to rediscover time and again. No matter how many times one "rewinds the tape of evolution", certain forms will always emerge.

- 57 Jacob von Uexküll, "A Stroll Through the Worlds of Animals and Men" in
Semiotica, Special Issue, 89-4, 1992, p. 323.
- 58 Idem, p. 323.
- 59 Ray Jackendoff, *Consciousness and the Computational Mind*, MIT Press,
Cambridge, Mass apud Francisco J. Varela, Evan Thompson, Eleanor Rosch,
The Embodied Mind, MIT Press, Cambridge, MA, 1991 p. 52.
- 60 Daniel C. Dennett, "Quining Qualia", in A. Marcel and E. Bisiach, (Editors),
Consciousness in Modern Science, Oxford University Press, 1988.
- 61 Idem.
- 62 Daniel C. Dennett, "Elbow Room apud Francisco J. Varela, Evan Thompson,
Eleanor Rosch, *The Embodied Mind*, MIT Press, Cambridge, MA, USA.
1991, pp. 50-1.
- 63 Idem, p. 53.