

Biosemiotics and the Collision of Modernism With Postmodernity

A Biossemiótica e a Colisão do Modernismo com a Pós-modernidade

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Abstract: I report here the development in the recently established biosemiotics – a science at the borderland of biology and semiotics. The kernel of discussions is in the question whether biosemiotics can develop into a standard science, or if the very nature of semiotics does not allow this. The second circle of disputes is the question concerning levels of semiotic development at different levels of organization of the living. I illustrate the problems on the recent exchange between the defender of scientific biosemiotics Marcello Barbieri, and the semiotician John Deely. I try to highlight the most interesting, hence most problematic points of the discussion, and punctuate them with my own opinions.

Keywords: Biosemiotics. Hermeneutics by the living. History of Western thought. Levels of interpretation. The nature of semiotic systems.

Resumo: Registro aqui o desenvolvimento na recém-determinada biossemiótica – uma ciência no limiar entre a biologia e a semiótica. O núcleo das discussões reside nas questões se a biossemiótica pode se desenvolver em uma ciência padrão, ou se a própria natureza da semiótica não o permite. O segundo círculo de disputas é a questão referente aos níveis do desenvolvimento da semiótica em diferentes níveis de organização dos vivos. Ilustro os problemas surgidos na recente troca de ideias entre o defensor da biossemiótica científica Marcello Barbieri, e o semiótico John Deely. Procuro acentuar os pontos mais interessantes, daí os mais problemáticos, da discussão, pontuando-os com minha opinião.

Palavras-chave: Biossemiótica. Hermenêutica dos seres vivos. História do pensamento ocidental. Natureza dos sistemas semióticos. Níveis de interpretação.

Hermeneutic biosemiotics [...] wants to take biology into a field of the humanities, whereas code biosemiotics wants to keep it within science, because meaning is a *natural* entity and we must introduce it in science just as we have introduced the concepts of energy and information. And this is not because science is superior to the humanities. It is because organic meaning exists in the organic world just as cultural meaning exists in the cultural world. A true synthesis of biology and semiotics, in short, cannot be the reduction of one to the other. It can only be the realization that there is no unbridgeable divide between them. (BARBIERI, 2009, p. 235-6)

[The postmodern] horizon lies at the heart of semiotics as the doctrine of signs, vindicating against the modernity [...] despite the modern philosophers: *ens et verum convertuntur*, ‘communication and being are coextensive’.” To be for nature is to be intelligible for the animal whose being is to understand, and the animal whose being is to understand is precisely the semiotic animal, the animal that is able to know that there are signs as well as to use signs, the animal that subsequently by studying signs comes to realize that the whole of experience, from its origins in sense to its farthest theoretical reaches, consists of sign-relations presenting and maintaining what they signify as objects, no less when those objects are also things than when they are pure objects. (DEELY, 2009a, p. 13)

Here I discuss the contemporary ferment in biosemiotics from the perspective of “hermeneutics done *by* the living”, an approach cultivated by our group in Prague (e.g., MARKOŠ, 2002; MARKOŠ et al., 2009; MARKOŠ, SVORCOVÁ, 2009). I concentrate on the endeavor to establish a “scientific biosemiotics” and tensions brought about by the effort.

The Way of Ideas, The Way of Signs

In his many writings (e.g., 2008; 2009a), John Deely depicts the history of Western spirituality as developing along two lineages, which he brands the “Way of Ideas” and the “Way of Signs”. The Way of Ideas is epitomized by Modernity with its science and philosophy both carried by the duality of *res extensa* and *res cogitans*; provided that it is practiced consistently, this Way ends inevitably, as Deely shows, in solipsism. The second Way was in favor in the Middle Ages, and has recently been resurrected under the flag of semiotics. (I add: if fostered consistently, it ends in pansemiotics). Let us accept the divide here:

1. Our ideal picture of science is one of a synchronous contraption, built on the idea (or better, the *belief*) of immutable *objects* reigning over and reining in a rigorous *method* how to create and characterize such objects, and how to state or falsify propositions concerning such objects. Time is but a linear variable serving to marshal the snapshots of changing mutual configuration of objects – in an immutable scaffold of Cartesian 3D space (an “endless aquarium”). Such changes are *causal* and subordinated to mathematics and logical laws. An ideal science is a *model constructed* according to fit such a world, which is a *created* world; there is no place for meaning (or novelty) therein except in the mind of its Creator. Living being can exist, in science, only as automata.

2. In contrast, the center point of semiotics is the *sign*, a relation resulting from the interpretative effort taking place *within, from inside* of the world, with things (dynamic objects), representamina, and interpretants in the incessant whirling of the semiotic spiral. Time has a semiotic dimension, which allows to incorporate – into *meaning* of the sign – contexts like causal relations, experience, history, memories, contents of databases, interpretation of records, constraints given by previous ontogeny, etc. A crucial statement to me, as a biologist, is as follows:

Ordinary causal interactions cannot occur save between things that actually exist. But the action of signs is not so confined, as many things that either no longer or have never existed can yet objectively be signified: this, probably above all else, is what distinguishes the action of signs. (DEELY, 2009a, p. 37)

A sign is not a construct (object) of mind, as it is not a thing of the world – it is a *relation* that may encompass whatever of these. Ever-evolving sign and its meaning (*to* or *for* an interpretant) are definitely not commensurable with objects of science and their deterministic interactions. Semiotics has no problem with embracing various aspects of Life.

Such ideal states of affairs as outlined above have never existed, neither in science nor semiotics. As for the sciences, they became blurred quite early in the Enlightenment by rejecting the Creator, and subsequently (and especially) by allowing *history* to enter the edifice: by accepting Darwinian evolution and the Big-Bang cosmology. In its turn, after Peirce semiotics became receptive to logic, and to the shimmering relations between things and objects.

Such an atmosphere is especially favorable for exploring various aspects of the living, with the scientific potential of modern biology on one side, and the semiotic and hermeneutic aspects of the living on the other.¹ We sketched the challenges and vistas of this development (MARKOŠ et al., 2009; MARKOŠ, SVORCOVÁ, 2009); here, I'll illustrate the recent ferment by referring to recent work by Marcello Barbieri (2008; 2009ab), and its criticism by John Deely (2009b); I will take the advantage of inserting my comments.

Scientific biosemiotics

The very expression “scientific biosemiotics” looks as an oxymoron in the light of what was said above, yet it represents a very respectful branch of research, personified especially by M. Barbieri and his *code biosemiotics*. He asserts that the principal characteristic of life is not mere duality of genotype (genetic texts) and phenotype (body). This is because causal physical relations do not interconnect these entities. Even if the phenotype obviously mirrors aspects of the genotype, this is not a simple cause-and-effect (if-then) relation like in physics. Rather, a third party mediates the relationship and it is this *adaptor* that harbors the code (i.e. the ribotype acting as a mediator between genetic information and protein). The existence of the adaptor and the code does not follow from any natural law – it is a result of a historical singularity (or process), and remains perpetuated across generations unnumbered (as a “frozen accident”, as an accumulation of contingencies in the course of generations, or by the active efforts of living beings). To embrace these processes in a

1 Though this gives rise to many misunderstandings, as demonstrated in the first line of our first epigraph. Contemporary English has forgotten about the divide between the particular science and its object: so, e.g., both biology and living beings come under “biology”, and the resulting nonsense begins to propagate. Nobody will foolishly “take biology into a field of the humanities”, as suggested, but *some* aspects of *living* are not accessible to the *science* of biology; they are better to study in doctrines like, e.g., semiotics, hermeneutics, or phenomenology (see MARKOŠ, 2009).

manner digestible within the realm of the science of biology, Barbieri introduces his definition of semiotic systems:

This is what defines the semiotic systems, and what makes them different from everything else: *a semiotic system is a system made of two independent worlds that are connected by the conventional rules of a code*. A semiotic system, in conclusion, is necessarily made of three distinct entities: *signs, meanings and code*. Here at last we have a definition where it is stated explicitly that a code is an essential component of a semiotic system. [...] The cell was described in this way as a structure made of genes, proteins and ribosoids, i.e., as a trinity of genotype, phenotype and ribotype. (BARBIERI, 2008, p. 25-26)

Such a definition is, of course, worthwhile as a heuristics in special cases of research,² but any claim of universal validity makes both semioticians and cell biologists somewhat uneasy. First, Barbieri *reifies* his *scientific* definitions: a gene becomes not information but the piece of DNA (i.e. the medium) containing that information. This material object (i.e., not a gene but a *phenotype* of the gene) becomes a *sign* whose *meaning* is the very molecule of protein; this meaning is approved by the *codemaker* (a ribosoid contraption), the site of the *code*. To put it in general terms, "Meaning is an object which is related to another object via a code" (BARBIERI, 2003, p. 5); compare this with the terminology of semiotics mentioned above.

To add to those terminological difficulties, Barbieri asserts that interpretation is by no means a *conditio sine qua non* of semiotics as such. Meaning becomes something to be distinguished as an object; no more is it an evanescent never-ending process evolving *to* and *for* an interpretant. Barbieri distinguishes three levels of semiosis: (1) manufacturing semiosis – like that encountered in protein synthesis; (2) signaling semiosis – involved in transduction, amplification, and signal decoding (e.g. hormonal or neural), and finally (3) interpretive semiosis – found only in humans and animals, beings who possess nervous systems and therefore have an internal representation of their world. Other critters must do with only two lower levels of semiosis.

It follows, for Barbieri, that *a cell is a semiotic system incapable of interpretation*; it is a seat of manufacturing and signaling semiosis only. This is, of course, an axiom, a belief. My colleagues and I, on the other hand, keep to another belief, which we maintain is more consistent with the biosemiotic endeavor: Life at *all* levels is able to handle its affairs. Our argumentation is based on recent scientific results describing the behavior of protein networks and structures in cell functioning and differentiation (e.g. MARKOŠ et al., 2009; MARKOŠ, SVORCOVÁ, 2009).

We object that Barbieri's definition of a cell can easily be applied to machines – like, e.g., computers – in short, artifacts that presuppose an engineer, a creator, a maker who/which is *outside* the artifact proper. He answers that *we all know* that, in contrast with computers, cells are product of evolution: it is true, but the fact is of no importance – when the workings of a machine is studied, the student cares not how it came into existence. After all, a model can be incorporated into standard science easily only when it is devoid of history, i.e. when fully deterministic.

2 As, e.g., was *information* for C. Shannon.

The place of interpretation

To sum up this point, I quote a letter from Barbieri (Dec 8, 2008, with permission): “The Biohermeneutics of Anton Markoš has one fundamental feature in common with the Biosemiotics of Thomas Sebeok: both theories claim that ‘interpretation’ is the defining feature of life.” He then presents 4 theses that, on his opinion, characterize our stance (and I agree), and he submits them to criticism:

- (1) Semiosis is based on Interpretation (Semiosis=Interpretation);
- (2) Life is based on Interpretation (Life=Interpretation);
- (3) Biohermeneutics goes beyond “Science”;
- (4) Biohermeneutics is against “Code Biosemiotics”.

The kernel of the critique is our statement that semiosis is impossible without interpretation. If we say that formal languages, for example, are devoid of interpretation, Barbieri counters: “Computer programs, technical codes (like the Morse code) and artificial languages are all made of signs, meanings and conventions.” Yes, but all those signs, meanings, and conventions, were implemented *by* us and can exist as such only *for* us. I therefore oppose such a statement – from our perspective, only the third developmental step of Barbieri’s *scala* belongs to semiotics (or even hermeneutics). If it cannot be proved that *all* life belongs to that level (i.e. that this level is not a specialty of languaging beings like humans), the very term *biosemiotics* may become dispensable: why not context-free “biogrammatic” or “biocomputing” instead? But back to the critique – it continues as follows:

The idea that *Life is based on Semiosis* is the foundational concept of Biosemiotics. [...] If this idea (“Life = Semiosis”) is combined with Proposition 1 (“Semiosis = Interpretation”) one obtains immediately Proposition 2 (“Life = Interpretation”). [...] Proposition 2 extends to the whole of life what is valid only for a limited part of it (the *pars pro toto* mistake). According to that proposition, Life is about ‘interpreting’ the world (i.e., it is about ‘knowledge’, ‘cognition’ etc.), whereas Life is first and foremost about ‘manufacturing’ the material components of living systems, and ‘organizing’ them into functioning wholes.

This is the central point of the polemics. Yes, we maintain that life *is* about interpreting the world, not about manufacturing. When Barbieri states “Proteins, for example, are built according to the genetic code, which is a set of exclusively internal rules, and do not have any other meanings in addition to those that come from genes”, we reply with a categorical No. The meaning of each individual protein molecule is *acquired* only when it enters (or better, becomes inserted into) the network of an “ecosystem” of hundreds of different protein species. Moreover, if both evolution and semiosis are based on history, on experience (MARKOŠ et al., 2009), their introduction into a standard science of biology could lead only to a contamination of science: recall how long it took for the sciences to swallow Darwinian evolution!³ Hence, it is true that “Markoš concluded that we should follow the approach of the humanities and

3 The price of this is that only a single and very special interpretation of Darwin prevails in contemporary biology.

study the history of life as a 'narrative', precisely as we study the history of human affairs." But, as already stated, it is not true, that "Biohermeneutics calls therefore for a radically new synthesis of biology and semiotics, a synthesis where biology leaves behind the objective world of science and becomes an extension of the humanities." Nor do we feel prepared to embark on the following enterprise: "If meaning and codes exist in living systems and modern science does not accept them, we should not abandon science, we should *reform it*."

Criticism in nine points

In a recent article (2008) but with different wording, Barbieri puts forth the theses discussed above. Right from the Abstract we read:

Biosemiotics asserts the idea that *semiosis* is fundamental to life, and that all living creatures are therefore semiotic systems. The idea itself is strongly supported by the evidence of the genetic code – but thus far it has made little impact in the scientific world, and is largely regarded as the basis for a philosophy of meaning, rather than a basis for a science of meaning.

The existing semiotic systems, he continues, are not suited for the goal of introducing semiotics to science: "Unfortunately, neither of them can be applied to the cell, and that is why most biologists continue to be skeptical about biosemiotics." (BARBIERI, 2008, p. 23) This is why, according to Barbieri, a *third* model of biosemiotics should be introduced, based on codes only:

The manifesto of the code-based biosemiotics was written by George and Muriel Beadle in 1966 in a single simple sentence: "the deciphering of the genetic code has revealed our possession of a language much older than hieroglyphics, a language as old as life itself a language that is the most living language of all - even if its letters are invisible and its words are buried in the cells of our bodies."⁴

From here, Barbieri develops his code biosemiotics devoid of interpretation, as briefly sketched above. He quotes the Peircean definition as formulated by Posner et al., eds. (1997, I, p. 4):

We stipulate that the following is a necessary and sufficient condition for something to be a semiosis: A interprets B as representing C. In this relational characterization of semiosis, A is the Interpretant, B is some object, property, relation, event, or state of affairs, and C is the meaning that A assigns to B.

Due to the axiom "The cell does not know interpretation", the definition cannot be accepted; moreover, it would lead to pansemiotic conclusion, that semiosis is the property of the universe (i.e. that world, after all, is *fysis*). This is a threat to science indeed, so Barbieri modifies the definition as follows:

4 We leave to the reader to make sense what is this *ad nauseam* repeated quote *about*. What is meant here by "language" – a string of letters "buried" in the cell? What piece of biosemiotics can be extracted from it?

We stipulate that the following is a necessary and sufficient condition for something to be a semiosis: A establishes a *conventional correspondence* between Band C. In this relational characterization of semiosis, A is the *Adaptor*, B is some object, property, relation, event, or state of affairs that is *taken* as a *sign* and C is the *meaning* that A assigns to B.

This, he asserts, will allow enough room for accepting the axiom that evolution proceeds from simple to complicated, i.e. that semiosis evolved in three steps as outlined above. I answer with a counter-axiom: hermeneutical and language-like properties are co-extensive with life, i.e. from its very beginnings: cells, animals and other life forms are co-extensive in this respect. I am convinced that Barbieri presents a model of formal language, which knows no semiosis, only grammar. To make my point clearer, I counterpoint my comments (as a *biologist*) with nine points which summarize Barbieri's article (p. 35; his points in bold, followed by my comments):

(1) Semiosis is defined by coding, not by interpretation. Semiosis is basically defined *as* the process of interpretation – there is no semiosis without interpretation. Coding/decoding is a formal-language procedure that has to be rooted in the realm of natural language: it is defined by hardwired prescription how to deal with things automatically *in cases when no semiosis is required*. Formal languages are derivative of natural languages – interpretation is reserved to the originator of formal language who is always both under and in the service of, the power of natural language. I am not a creationist, nor am I an adherent of cosmic energies of any sort; in which case, the only possible originator is – living being itself.

(2) The agents of semiosis are the codemakers, not the signs. Codemarkers represent rules of transformation from one code to another; they are formal-language tools of coding-decoding and can be understood as models of genuine speakers in special contexts.

(3) Signs and meanings are codemaker-dependent entities. Coding/decoding knows no semiosis, it is a mechanical (or better: deterministic) process. Signs and meanings therefore do not belong to the formal language of (natural) science; they may arise only in the realm of living.

(4) Genetic sequences are codemaker-dependent entities and are the organic signs of protein synthesis; and,

(5) Protein sequences are codemaker-dependent entities and are the organic meanings of protein synthesis. Points 4 and 5 summarize central aspects of the formal language model of life; they do not have much impact outside the realm of that model. There is no need to label such processes as semiotic.

(6) The translation apparatus is a semiotic system made of organic signs, organic meanings and the genetic code. The translation apparatus, as far as it works in a fully deterministic regime, is a *mechanism programmed in a formal language*: it knows no signs or meaning. Semiosis may enter when the strict rules are surpassed by commands imposed from levels external to translation machinery.

(7) The cell is a semiotic system made of genes, proteins and codemakers

(genotype, phenotype and ribotype). The cell definitely *is* a semiotic system, but it is neither made (constructed), nor does it consist solely of these three components; an uninterrupted chain of ancestors, with experience embedded, are inseparable from the cell as a semiotic system.

(8) The basic mechanisms of life are copying and coding; and,

(9) The basic mechanisms of evolution are natural selection (from copying) and natural conventions (from coding). The natural world knows no mechanism (in the sense of deterministic contraption). Life is an entity whose essential properties can be captured by a language analogy; some particulars are, of course, delegated to mechanisms. However, evolution is not a mechanical process, i.e. “mechanisms of evolution” is an oxymoron.

It follows that we also oppose the statement (p. 34):

The evolution of semiosis is characterized therefore by three great innovations: (1) the origin of organic semiosis (the semiotic threshold), (2) the origin of interpretation (the hermeneutic threshold), and (3) the origin of language (the symbolic threshold). The history of semiosis, in conclusion, was a process that started with context-free codes and produced codes that were more and more context-dependent. Today, our cultural codes are so heavily dependent on context that we can hardly imagine semiosis without interpretation, and yet these are distinct processes and we need to keep them apart if we want to understand their origin and their evolution in the history of life.

We argue that evolution began with a biosphere of language-like living beings (autonomous agents in a broader sense) negotiating their ways of existence with the environment (internal and external); successful solutions were only *subsequently* hardwired into deterministic mechanisms working with established codes. Such hardwired, hence reproducible, arrangements *can* become objects of science.

A suprasubjective relation

Here I will shortly refer to the article of John Deely: the principal part of it is, as in many other treatises of the author, devoted to clarifying the principles and goals of semiotics; one part, then, is a criticism of Barbieri.

Deely points out untiringly that the sign is a triadic relation with its object and interpretant, and is not something to be *pointed at* by the index finger, or identified with some *thing*. A sign is a suprasubjective relation unifying all three components of the semiotic motion, and it reflects the past states of semiosis, experience, memory, unique history of preceding relations, etc.

However, members of our culture, heirs of the Enlightenment, feel a strong temptation to reify such relations. The result is a caricature where representamen – the carrier of the sign – is confused with the sign proper, and instead of the interpretant we find a human being interpreting all this in his/her mind. The second constant of Deely’s work is the steady reference to the dyadism of Saussurian semiology, which renders it liable to the modern dualism of mind-objects (or better mental representations – words) to such an extent that it resides in an abstract field of mind and language.

Our point of departure is not simply the common understanding of what some particular thing is as “a sign”, but the question of what is sign such that it can function in the way that it impresses us as doing: revealing nature, stitching together culture and nature, real and unreal relations, weaving the fabric of experience, and leading us down blind alleys and cul-de-sacs as well as broad avenues of being in the forests of human belief. (DEELY, 2009b, p. 176)

If it is unimportant whether relations are or are not dependent on mind, it follows that signs transcend, as suprasubjective, all divides such as nature-culture, self-nonselself, subjective-physical, etc.:

A causal relation, for example, in modern thought, is considered as the interaction of two or more things. But such interaction is not a relation; a relation is what results from and survives as *over and above* the interaction. A relation is invisible to sense, even though it unites the sensed; and it is indifferent to spatial distance, unlike the interaction which gave rise to it. All of this, then, enters into our semiotic notion of sign. A sign as provenating a triadic relation is not an object, or at least need not be. On the contrary, the action of signs — semiosis — is what every object presupposes. (DEELY, 2009b, p. 177)

He then continues, stating that all analyses of sign presupposing the existence of a code are reducible to a dyadic, i.e. causal, relations; they cannot give rise to a triadic system required. Saussurian or Barbierian code semiotics represent therefore only *pars* not *totum* of a semiotic analysis, and cannot found any semiotic doctrine. Both models draw their inspiration from the Enlightenment:

In the Enlightenment, thinkers were mainly animated by the idea that the new science, based on experimentation and mathematization of results, would “slow by slow” displace and replace all previous human knowledge. It took some centuries for thinkers to begin to start to commence to realize that this was by no means possible, for the excellent reason that if the whole of the knowledge we acquire before becoming scientists has no independent validity, then science itself would have no validity. Yet even today, *by no means* have all thinkers awakened from the Enlightenment “dream of reason”; so Barbieri is hardly alone in his vision for a “science” of biosemiotics that sets philosophy off to one side as otiose for the future of biosemiotics. (2008, p. 179-180)

Deely regrets that Barbieri, with his views being a quintessence of the Enlightenment ideal, has imposed one of the last spells of positivism on biosemiotics.

Conclusions

We support the idea of natural conventions as fellow-travelers of natural selection in evolution; we maintain, however, that such conventions are *actively* sought for, negotiated inside community(ies), and their meaning is being *actively* maintained (or changed) by the collective effort of such community. Science accesses the well-established *habits* that result from such evolutionary negotiations (habits, not laws). The science of biology is the study of the (synchronous) functioning of living processes, of hardwired solutions, of the ontogeny of such networks, and even the history of how they might have come into existence. The “essence of life”, however, is to be sought in interpretative efforts as studied within semiotics and hermeneutics.

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