

Zoosemiotics and (or versus?) natural sciences : an often troubled relationship

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Résumé. In the article, the author attempts to problematize the positioning of zoosemiotics within the wider area of biosemiotics, and the often difficult relationship between the latter and natural sciences. Ideally, zoosemiotics aims at meeting Sebeok's wish to produce an added value in "merging the life sciences with the sign sciences", by providing a set of theoretical strategies and conceptual bridges that support and hopefully improve the study of animal semiosis. Most of all – something that semiotic studies have always been good at – zoosemiotics and biosemiotics would provide a reliable, flexible-yet-consistent, methodology for framing the different and diverse semiotic phenomena.

In this respect, and to more than one extent, the dialogue with natural sciences, though not always active, has been constant, and has produced remarkable results. At the same time, however, it has also proved difficult in at least two, contradictory, manners: the repeated tendency, manifested within biosemiotics, to cover extremely wide, virtually endless, ground (from the infinitely small to the infinitely big, often forgetting to employ empirical approaches), and, *au contraire*, the tendency to exclude the human species from its scopes, as if humanity was after all an entity separated from biology.

The article, then, draws its conclusions in form of a "state of the art" overview of zoosemiotics today, trying to emphasize opportunities and challenges in the field, after over 50 years from its birth and establishment.

ZOOSEMIOTICS, CODE-BASED BIOSEMIOTICS, SIGN-BASED BIOSEMIOTICS, BIOLOGY, SEBEOK

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Zoosemiotics and (or versus?) natural sciences : an often troubled relationship

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Introduction

In 1995, at the Collegium Budapest, where he was Senior Fellow, Thomas Sebeok delivered an important paper (Sebeok 1995), discussing the initial conditions for a relationship between semiotics and biological sciences. He rhetorically wondered what probably most biologists *really* have been wondering about the alleged necessity to let semiotics participate in the natural sciences' discourse: "If one accepts the intrinsic identity of the life science and the sign science, combining at their root into a 'natural semi-otics' [...] the question still lingers: what is gained thereby?" (Sebeok 1995: 6).

The scope of this article is to propose some reflections about the affinity between zoosemiotics and other natural sciences, and to explore the *role* played by each of them in the construction of the zoosemiotic scientific discourse.

Ethology is inevitably the point of departure, and the major focus, first because the similarity of interests between the two disciplines goes well beyond the differences in methodologies and epistemology, and second because this connection was already in the agenda of zoosemiotics since its early days (Sebeok 1963). In a 1969 article entitled "Semiotics and ethology" (in Sebeok-Ramsay 1969: 22-161), Sebeok presented the terms of this connection, with the additional service of a very detailed bibliography of, so to speak, converging studies. At the time, Sebeok had set the

important task of showing ethologists (and biologists in general) that the systematics of zoosemiotics was an effective way for classifying communication, and that its theoretical tools had great *potential* for analysing it.

The early steps of zoosemiotics had been mostly characterized by the use of the term as a general way to label the various approaches to animal communication. Not yet having an approach of its own, zoosemiotics was borrowing from classical ethological school much more than it was offering. The innovations occurred in ethology during the 1970's, however, determined an advancement that, perhaps by coincidence, perhaps not, had repercussions on zoosemiotics as well. "Cognitive" became a keyword for both fields. The idea that there could be an intermediate stage between a stimulus received by an organism and its behavioral response, which had been bypassed by behaviorism, was adopted by both ethologists, in the form of cognitive processes, and by zoosemioticians in the familiar form of interpretation.

If neither the classical ethology of Lorenz or Tinbergen, nor the behaviorist school were too keen on the possibility to understand the mental processes of animals via scientific methods, the new cognitive trend was now devoted to the "the evolutionary and comparative study of nonhuman animal thought processes, consciousness, beliefs, or rationality, and [to] an area in which research is informed by different types of investigations and explanation" (Bekoff 1995: 119). Although some of the contents of this discipline were already anticipated by Darwin and some of his followers, the birth and definition of the term took place only after the crucial Griffin (1976). Griffin had introduced the topic in the following way:

Ethologists and comparative psychologists have discovered increasing complexities in animal behaviour during the past few decades. [...] The flexibility and appropriateness of such behaviour suggest not only that complex processes occur within animal brains, but that these events may have much in common with our own mental experiences. To the extent that this line of thought proves to be valid, it will require modification of currently accepted views of scientists concerning the relationship between animal and human behaviour. Because of the important implications of these developments in ethology, [cognitive ethology] will examine both the pertinent evidence and its general significance in the hope of stimulating renewed interest in, and investigation of, the possibility that mental experiences occur in animals and have important effects on their behaviour. (Griffin 1976: 3-4)

A position like Griffin's, courageous at the time, gave cognitive ethology in the long run a more established and visible role, and a large following, too. Zoosemiotics was one of the fields that took up the challenge. Sebeok (1981) contains already several hints in that direction, while, in more

recent times, it is safe to say that most efforts in zoosemiotic research have explicitly embraced this approach.

Other branches of ethology are in a significant relationship with zoosemiotics. To start with, one must count in all those specialized fields that focus either on a specific portion of animal semiosis (*e. g.*, acoustic signals for bioacoustics, sociality for sociobiology, and so on), or on a given species/family/order (like in the cases of ornithology, cetology, primatology, entomology, etc.). It is crucial for the zoosemiotician to keep up to date with the developments of each of these disciplines, even when (as in the case of bioacoustics) the communion of interests does not correspond to a communion of conclusions (it is safe to say that bioacoustics and zoosemiotics run in the same direction, but on two parallel tracks).

In an ideal world the zoosemiotician may, without fear, answer Sebeok's rhetorical question: "what is gained [by merging the life sciences with the sign sciences]?". Zoosemiotics, when 1) scientific and 2) up to date, provides a set of theoretical strategies and conceptual bridges that *support* and, with a bit of luck, *improve* the study of animal semiosis (if anything, at least making it clear that communication is not the only phenomenon related to information production and reception). Most of all – something that semiotic studies have always been good at – it provides a reliable, flexible-yet-consistent, methodology for framing the different and diverse semiotic phenomena.

The dialogue with natural sciences has not been always active, but it has been constant, and has produced remarkable results. It is a mutual relationship that is needed, and wished for, from both sides, not only the zoosemiotic one:

Interdisciplinary efforts, despite possible pitfalls (...), are essential in our quest for knowledge about animal minds. In these joint efforts, open minds and pluralism would also be useful at this stage of the game (...). Philosophers need to be clear when they tell us about what they think about animal minds and those who carefully study the behavior of nonhumans need to tell philosophers what we know, what we are able to do, and how we go about doing our research. Although providing alternatives might not be a requirement in thought experiments that conclude that animals do not have beliefs for one or another reason, it would be useful for students of behavior to be presented with some viable alternatives that could be used in their empirical investigations. If it is because philosophers do not have the experience with empirical work that allows them to make realistic suggestions for experimental design, then it would be useful for philosophers to watch ethologists at work (...). This experience might allow philosophers to gain a better understanding of what ethology is all about. Even then, it may be the case that ethologists

are ill-advised to look to philosophers for a crisp and empirically rigorous definition of intentionality (for example), even if some philosophers promise to provide one (...). (Bekoff 1995: 139)

1. Biosemiotics and zoosemiotics

Before opening up to non-human life forms, semiotics had been an anthropocentric and logocentric discipline, with an exclusive emphasis on human- and language-related issues (this despite the fact that the earliest conscious examples of semiotics consisted in the medical observation of the body – symptomatology, diagnostics, etc. – carried out by the likes of Hippocrates or Galen of Pergamon). John Locke, in the 17th century, used the word *semiotics* to describe the “doctrine of signs”. It was once again a human-centred enterprise. Yet,

While his prime concern was with those signs of our ideas “which men have found most convenient, and therefore generally make use of”, that is, “articulate sounds” or verbal signs, Locke was fully aware that other creatures, such as birds, also have perception, “retain ideas in their memories, and use them for patterns”, in brief, that they are comparably served by signs. (Sebeok 1990: 37)

The real turning point appeared in the 19th century, as Charles S. Peirce gave a first clear acknowledgement of the semiotic nature of the non-human world (to him, the sign was a connective element not only in all experience and thought, but in the whole universe), but it is not until the biologist Jakob von Uexküll that the first, important, specific argumentation in support of what is nowadays known as biosemiotics, appears, that is, the study of semiosis in living forms. Uexküll’s *Institut für Umweltforschung*, founded in 1926 at Hamburg University, investigated the perceptive environment of animals, that is, their *Umwelt*. Though not a semiotician, Uexküll brought to attention a number of topics of fundamental semiotic interest, and later his son Thure, and Sebeok himself, introduced his work to the semiotic community, labelling the German biologist with the term “cryptosemiotician”.

All this was going on while the then-dominant school of semiotics, the so-called semiology, of Saussurean tradition, made it very clear that the discipline was a natural continuation of linguistics, or even – as Barthes had put it – just a part of it. Further signals of an upcoming new field of inquiry came from Charles Morris, the truest follower of Peirce (*e.g.*, Morris 1946), from the oncologist Giorgio Prodi (1983), who termed the study of biological codes “Nature Semiotics”, and from Friedrich S. Rothschild (1962: 777), who first actually used the term “biosemiotics” in

a scientific context. One year later, Sebeok coined the term and developed the theoretical paradigm of a specific biosemiotic field named “zoosemiotics”, somehow inaugurating a new phase for semiotic history, a phase in which non-human semiotics is no longer ignored or underrated. Sebeok maintained that

The process of message exchanges, or semiosis, is an indispensable characteristic of all terrestrial life forms. It is this capacity for containing, replicating, and expressing messages, of extracting their signification, that, in fact, distinguishes them more from the nonliving – except for human agents, such as computers or robots, that can be programmed to simulate communication – than any other traits often cited. The study of the twin processes of communication and signification can be regarded as ultimately a branch of the life science, or as belonging in large part to nature, in some part to culture, which is, of course, also a part of nature. (Sebeok 1991: 22)

Later, he added that “the life science and the sign science thus mutually imply one another” (Sebeok 1994: 114). In addition, Jesper Hoffmeyer pointed out the centrality of semiosis in biological studies. To Hoffmeyer, the biggest contribution that biosemiotics can make to the life sciences is the emancipation of sign and semiosis as the crucial elements in life: semiosis is the “most pronounced feature of organic evolution”, and signs are the “basic units for studying life” (Hoffmeyer 1995: 369):

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).

A somehow antagonistic position was held by Marcello Barbieri, who was on the contrary a supporter of a code-based biosemiotics, an approach that focuses on three important aspects:

One is the idea that the cell is a duality of genotype and phenotype, *i. e.*, a biological computer made of genetic software and protein hardware. The crucial point is that a computer contains codes but is not a semiotic system because its codes come from a codemaker, which is outside the system. The second basic idea concept is the idea that all biological novelties are generated by natural selection, *i. e.*, by an agent, which is outside the cell just as the human mind is outside the computer. But if the cell is a biological computer assembled by natural selection, it is perfectly legitimate to say that it is not a semiotic system, and this justifies Florkin’s statement that there is no real meaning in it. Ultimately, that leads to the physicalist thesis that there is no real code either at the molecular level, and that molecular semiosis is merely an illusion. The computer model of the cell, in

short, keeps semiosis out of the cell, and this is why the first true model of molecular semiosis was the idea that every cell is a trinity of genotype, phenotype, and ribotype, *i. e.*, the idea that the cell contains an internal codemaker [...] This was complemented by the idea that coding is not reducible to copying, and, therefore, that natural selection (based on copying) and natural conventions (based on coding) are two distinct mechanisms of evolution [...] Another important contribution to code-based biosemiotics came from the discovery of an increasing number of organic codes. That development started with the unveiling of the sequence codes by Trifonov [...] and has grown slowly but steadily ever since [...] The “code based” approach to biosemiotics, in short, is a road that started with the recognition of semiosis at the molecular level and worked its way up by extending the concepts of code and meaning to the higher levels of biological organization. At about the same time, however, there was also another road to biosemiotics that was being developed. A road that went exactly the other way round, *i. e.*, that started at the higher levels and worked its way down towards the lower ones. (Barbieri 2008: 594)

This discussion is still one of the hottest ones within biosemiotics. Both Barbieri’s and Hoffmeyer’s schools make a strong case for the centrality of semiosis in biological processes, and for the intimately interdisciplinary nature of biosemiotic research.

2. Biosemiotics-Biology: a difficult relationship

Another definition of biosemiotics worthwhile reading is that of Kalevi Kull:

Biosemiotics can be defined as the science of signs [in living systems]. A principal and distinctive characteristic of semiotic biology lays in the understanding that in living, entities do not interact like mechanical bodies, but rather as messages, the pieces of text. This means that the whole determinism is of another type. [...] The phenomena of recognition, memory, categorization, mimicry, learning, communication are thus among those of interest for biosemiotic research, together with the analysis of the application of the tools and notions of semiotics (text, translation, interpretation, semiosis, types of sign, meaning) in the biological realm (Kull 1999: 386)

Kull is here suggesting that the introduction of semiotics in biological studies is not only worthwhile in the direction of a new theoretical paradigm (*e. g.*, the centrality of semiosis rather than morphology), but also in strictly methodological terms: Nature, in other words, can be read as a text, it can be interpreted, it has a meaning, and so forth. So, is biosemiotics, after all, about just anything and everything?

When a perspective of this type comes to mind, it is difficult not to feel a bit dizzy, and that is why one of the goals of this article is to point out

the dangers of, so to say, over-indulging in that promised land of answers to all questions that sometimes semiotics seems to display (or, to be more precise, that many semioticians seem to envision). It is a risk that other scientific communities have already perceived, and this is perhaps why the reputation of semiotics is not always high within the academic world at the moment, after having enjoyed a golden age of respect and admiration back in the 1960's and 1970's (*i. e.*, when semiotics did *not* claim to have such an omnicomprehensive range of interests). It is therefore important to address the question of the position (*i. e.*, potentials *and* limitations) of zoosemiotics within the realm of animal studies.

The theoretical foundations of the whole biosemiotics field have been exposed to a significant amount of criticism, from both semiotic insiders and outsiders (typically from other biological sciences). Before discussing these criticisms from a strictly semiotic perspective, let us shortly review the contacts between biosemiotics and other fields of life sciences, mostly awkward ones. According to Hoffmeyer,

20th century life sciences have been characterised by two major trends. One trend is molecular and genetic reductionism. This trend is well known and needs no further comment. Beginning as an undercurrent to this trend, however, another much less noticed but in the long run just as important trend has gradually been unfolding: The semiotization of nature. (Hoffmeyer 1997: 355)

It can safely be said that the second trend mentioned by Hoffmeyer was the one that was welcomed most reluctantly by biologists. The history of modern biosemiotics has also been a history of contrasts and subtle fights between semioticians and scholars belonging to other fields. To be fair, it should be said that this was due both to a conservative attitude of the traditional biological sciences, typically hostile to theoretical/methodological changes in their field, and to a certain occasional arrogance from biosemioticians, firmly convinced of the undisputable superiority of semiotics over other disciplines. To mention one example, Konrad Lorenz was definitely inspired by the work of Uexküll, and certainly ethology can be credited with having an intimately semiotic nature (its main branches being animal communication and sociobiology). But pushing that link as far as to say, like Sebeok did, that ethology is “hardly more than a special case of diachronic semiotics” (Sebeok 1976: 156) is a bit reductive towards a field which not only may easily have a synchronic approach too, but – more importantly – focuses its investigation on topics that all in all are not of great semiotic interest at all.

Another interesting contact between biosemiotics and other sciences happened in 1953, after Watson-Crick's modelling of DNA and consequent

understanding of the genetic code. This event marked the beginning of a theoretical process that led to the understanding of the importance of endosemiotic research, along with the exosemiotic one. Moreover, Roman Jakobson, in 1973, underlined the several similarities between genetic code and human language, in terms of dynamics and articulation, but still his claim remained unheard among biologists, who – with very few exceptions – resisted the possibility even of applying semiotic terminology to their work.

It was interesting, in this respect, that Eugene Yates had noticed that a semiotic-related vocabulary was anyway very much in use within the field of biochemistry (Yates 1985). Terms like recognition, messaging, signalling, etc. were just as ordinary as any other (metaphorical or not) expression used to describe biological processes. Yates took a sample of 60 articles for his investigation, and noticed that almost 50% of them were titled with semiotic-friendly words and expressions. But it is also true that if biologists are interested in that kind of terminology, that is mostly due to their interest in information theory, rather than semiotics.

Another uneasy contact between biosemiotics and biological sciences concerns the challenge launched against neo-Darwinism in the field of evolutionary biology, by the so-called *infodynamics* (after Brooks and Wiley 1986; Salthe 1993 and others). Infodynamics “subsumes thermodynamics and information theory, essentially animating the latter by means of the former” (Salthe 1993: 6).

Still Hoffmeyer claims that the idea is intrinsically semiotic:

The general idea as originally suggested by Dan Brooks and Ed Wiley is that information capacity (disorder) increases spontaneously in developing systems, being produced along with physical entropy as the system grows and differentiates. Since such self-organisation is a prevalent property of our universe, natural selection should not be seen as the dominating force of evolution, but rather as playing the more modest role of pruning down the novelty that is constantly and autonomously being generated by the requirements of the second law of thermodynamics. [...] I have discussed the surprising correspondence between these ideas and the “cosmogonic philosophy” of Charles Sanders Peirce. (Hoffmeyer 1997: 359)

The discussion remained lively also in fields like artificial life, where again biosemiotics had (and has) something to say that would call into question the traditional paradigms of biological sciences. At present, the situation is still unclear, and although more and more biologists are accepting and promoting biosemiotic approaches, it is also true that in most of the cases this promotion occurs through channels that are – so to say – slightly less institutional than those used by other disciplines. The academic attitude

towards a semiotically-inclined biologist is still that of the black sheep among the white “normal” ones, although it is undeniable that, slowly but steadily, the number of black sheep is increasing.

Barbieri maintains that:

Modern biology has not accepted [...] that the existence of the genetic code implies that every cell is a semiotic system. And this is no accident. The rejection of the semiotic nature of life has been, and continues to be, extremely widespread because it is the logical consequence of at least three concepts that lie at the very heart of modern biology. (Barbieri 2008: 578)

These three pillars are the genotype-phenotype model, physicalism and natural selection, which Barbieri considers:

totally alien to the idea that semiosis is fundamental to life. This idea, therefore, can become part of biology only if we prove that all the above concepts can be replaced by more general ones. That is what biosemiotics is really about. It is about a new biological paradigm that gives us (1) a new model of the cell, (2) a real alternative to physicalism, and (3) a new mechanism of evolution. These are the great novelties of biosemiotics. (Barbieri 2008: 578)

2.1 *Remarks from the semiotic insiders*

A considerable amount of criticism comes also from the insiders of the semiotic community (although, perhaps, not necessarily insiders of *biosemiotics*). Mostly, for the purposes of the present article (whose main focus remains *zoosemiotics*), one has to reflect on the role that *zoosemiotics* plays within *biosemiotics*. That is, how much is *zoosemiotics part of biosemiotics*?

Few years ago, in a kind of bittersweet ironic mode, I made the following reflection:

The interests covered [by *zoosemiotics*] include the human-animal semiotic relationship, the concept of “animal”, animal aesthetics, play behaviour, deceiving behaviour, several ethical and methodological issues, the cultural representation of the animal, interspecific communication, the concept of language, zoomusicology, mimicry, cognitive issues, ethological issues, etc. It really does not look like a restricted range of interests. There are some 1,250,000 animal species on this planet, and they *all* do many interesting things with signs. Yet, on the occasion of a biosemiotic congress, symposium or session, it is already half a miracle if one, sometimes two, scholars speak of any of those topics.

As member of the biosemiotic community, a *zoosemiotician* can be sent articles to review, and they are called things like *The Physics and Metaphysics of Biosemiotics*; *Biosemiotics as a Mode of Thermodynamics*

in Second Person Description; Beyond bioinformatics: can similarity be measured in the digital world? What is a zoosemiotician supposed to know about these things? (Martinelli 2010: 34)

Is it acceptable to feel so lost in this huge galaxy of topics and still consider oneself as member of the community? Biosemiotics seems to deal with all kinds of things, and all sizes: from the infinitely small (DNA, for one) to the infinitely big (the Cosmos). And all that stays in the middle. Sure: *bios* is a Greek word for life: in taxonomy, before reaching Life, one needs approximately 9 steps: Species, Genus, Family, Order, Class, Phylum, Kingdom, Domain, and finally Life. And human being, the subject of a massive number of semioticians, is just a species, *i. e.*, the first step. So: what is exactly biosemiotics? Is there such a thing as *one* biosemiotics? Is it really so that talking about mushrooms has to happen in the same context where the next paper is about subjectivity, the one after that is about beavers, and the previous was about the origins of the universe?

The domain of the living is virtually endless, but it is exactly when one realizes that something is about everything that it becomes about nothing. Is it healthy for a discipline to be so generic? How can a zoosemiotician give helpful feedback to the micosemiotician colleague? And how can the latter say something useful in the context of – let us say – dolphin signature whistles?

A decision may be called for to decide whether the label “biosemiotics” wants to be an umbrella term, or a discipline with a strong – and strong often means circumscribed – paradigm. If the latter option is chosen, then one needs to trace a path that goes towards choice, distinction, and specialization.

This is called for also because, and it is probably the *main* fear (or misunderstanding), not too rarely biosemiotics is experiencing something similar to a metaphysical drift, or – to put it mildly – an empirical support to the interpretation of given life processes does not always seem to be a priority. And this may be directly related to the not-amazingly-positive reputation that biosemiotics has within other scientific fields.

This state of affairs becomes even more awkward when confronted with another, diametrically opposite, problem. That is: when biosemioticians look at one side, they see no limits whatsoever; when they look at the other side, all of a sudden they see the Pillars of Hercules. Biosemiotics sees its analytical potentials as unlimited, but only (if “only” is the word) when they do not interfere with the untouchable dualism Culture-Nature (or, basically: human/non-human): Nature allowed,

Culture not. Culture is not a living process, apparently. It seems not to be perceived as having any biological basis, or any part in detecting the meaning of life. Yet, it would be easy to prove otherwise, both rhetorically and scientifically. Not to mention that scholars who like Peirce so much (as biosemioticians tend to do) should be anxious to support the notion of synechism.

It is difficult not to interpret this choice not as the result of a pondered scientific decision, but more as an ideological one. In an environment, the semiotic one, dominated by scholars who deal with human matters, biosemiotics came to cover just everything-that-is-not-human. Which is a definition by negation, not by affirmation. Take humans out, and what remains is biosemiotics.

For this reason, in a general semiotic congress, the zoosemiotician who studies the experimental programs of language acquisition in chimpanzees gets to give his/her paper in a session called things like "Semiotics and nature", along with colleagues who study mushrooms, photosynthesis and bacteria, while at the same time, in a parallel session called "Semiotics and language", another colleague is giving a paper on language acquisition in human children.

Zoosemiotics, thus, gets to be placed exactly in the middle of this tug of war: *pulled in* by a community of people who mostly study life-related topics *outside* the animal kingdom, and pushed out by a community who study the animal species *Homo sapiens*.

Regretfully, this is not the kind of specialization called for. Because if the point is to accept once again, although in disguised form, and pretending to do something else, the Aristotelian/Cartesian dualism, then it becomes hard for a zoosemiotician to identify him/herself with this community. Regardless of how much against this perspective one might be ideologically, the thing is that plenty of research interests within zoosemiotics fall into the category of cultural processes. Or where else should reasonably fit such topics as aesthetic behavior, human-animal relationship or the notion of language? And, more generally, *any* paper discussing animals remains closer to any paper discussing humans (animals too, surprise surprise) than any paper discussing plants or other life domains.

Semioticians like Kristian Bankov became so annoyed by this unlimited extension of the biosemiotic field, to actually conceive, back in 2005, a sort of Ockham's Razor (ironically baptized Bankov's Razor by Bankov himself) to revise, among other things, "1) the philosophic grounds of the biosemiotic discourse" and "2) the scientific output of biosemiotics" (Martinelli-Bankov 2008: 399):

Concerning the first point, one must distinguish between several interrelated discursive orientations within the field of biosemiotics. 1) A strong ontological pretense in biosemiotics, a philosophically-grounded claim on how things hang together, what the real essence of nature and life is, etc. "Life is coextensive with semiosis" is characteristic of that kind of reflections. 2) A huge part in biosemiotics, dedicated to a kind of history of ideas, relevant to its predecessors or discovery of biosemiotic ideas in "unexpected" thinkers and scientists. That includes contributions of systematization of the contemporary advances in the field. 3) A descriptive, strictly scientific, orientation, concerning facts in the Universe and the biosphere: Big Bang, cells, molecules, plants, bacteria, animal behavior, etc. [...] 4) Last but not least, the contribution on current socio-political issues like ecological consciousness, "biomoral" and others, where biosemioticians are expert voices in the public space.

Considering this variety of discursive orientations, it is difficult to establish any clear identity for biosemiotics. After hearing that biosemiotics is "the study of signs, of communication, and of information in living organisms" (as stated in the Oxford Dictionary of Biochemistry and Molecular Biology) and even more: "the scientific study of biosemiosis" [...], an unprejudiced observer would imagine people with an experimental agenda. Kalevi Kull claims that "Biosemiotics means biology" (2002: 332). My expectations were similar, but when I started reading books and papers I found much more philosophy than laboratory/field work. Somehow, the identity of the discipline was to be established more as an interpretive than as a productive approach. And I think that more or less all scholars in biosemiotics would agree on the precept, present in any extended definition, that biosemiotics offers the existing biological theories a kind of generalizing view which they lack and they need. (*Ibid.*, p. 399-400)

Although controversial in some aspects, the notion had the great merit of shaking the coconut tree of biosemiotics, forcing some insiders of the field to seriously reflect upon the scientific role of biosemiotics, its weaknesses and its strengths – myself included.

In one the main points of his argument, Bankov noted that a certain "scientific humility" that he expects from biosemiotics is "not present in the majority of biosemiotic papers" (*Ibid.*, p. 401). It is difficult not to agree, although, in my case, for reasons that are not necessarily the ones indicated by Bankov (I shall return on these). A certain arrogance has indeed been displayed in quite a few occasions, when it comes to both the foundations of the discipline, and its theoretical – so to say – heritage. The above-mentioned metaphysical drift is already something that speaks for itself, but one may add at least the presumption of many biosemioticians that biosemiotics offers a more consistent view of natural phenomena than biology; the (luckily-just-occasional) tendency to refuse, or at least

underrate, the contributions to semiotics provided by those semioticians who were never *biosemioticians*, or who anyway refer to completely different fields of inquiry (Greimas, Saussure, Eco...); the habit of turning big scholars of the past into “crypto-semioticians” as if to create a deterministic cosmology of human knowledge that was doomed to be semiotic in its entirety, and so forth.

2.2 *Defending biosemiotics*

After creating some distance from what can be considered excesses in the theoretical program of biosemiotics (and semiotics in general), a few words should be also spent in defence of aspects for which, on the contrary, biosemiotics is unfairly criticized.

As Bankov’s Razor was mentioned as a semiotic insider’s criticism of biosemiotics, a more extended picture of those remarks should be now offered, emphasizing also the parts that may be considered erroneously addressed. Bankov says:

This presumed superiority of biosemiotics on conventional biology and mechanistic science is out of place. Biosemiotics is totally dependent not only on the existing data achieved within certain sciences. It is entirely dependent on the very scientific worldview, on its articulations and categorizations of the surrounding world, on the biological terminology, on the theory of evolution and the like. Biosemiotics would be nothing without them, whereas they, the conventionally affirmed disciplines, have existed, exist and will exist totally unaware of biosemiotics. (*Ibid.*, p. 401)

Although one can hardly deny that there is a certain form of dependence, in the way described above, it is rather hard to see this as an exclusive problem of biosemiotics. All disciplines depend in some form from those that previously dealt with the same issues. Did not musical semiotics depend on musicology and music theory? Did not classical semiology depend on linguistics (up to the point that many scholars we happily called semiologists or semioticians, like Saussure, Hjelmslev, Jakobson were in fact linguists)? They certainly did, except that, exactly like biosemiotics, they were able to develop an identity of their own, autonomous enough to enable us to consider them “something else”. It is acceptable to say that the autonomy of semiology from linguistics, when it comes to specific analysis, is generally superior to that of biosemiotics from biology, but then again, semiology is older. Biosemiotics should be given some time to develop comparatively.

Biosemiotics may borrow from biology by paraphrasing it in semiotic terms, but that is not the end of the story: biosemiotics *did* propose a

consistent number of novel theories and methodologies (in fact, maybe even too many, which is rather what I have been pointing out in the first part of this article), and these have just nothing to do with those “other” sciences, starting from the principle itself that animates the entire biosemiotic idea, *i. e.*, identifying the biosphere with the semiosphere, with all the thousands consequences and the shift of mentality implied. Nothing appears to be “borrowed from biology” in the theories of Barbieri, Kull, Hoffmeyer, Weber, Emmeche, Markos, and many others, if not in sporadic cases, and with a legitimate right of overlapping with other fields every now and then. If, let us say, Barbieri argues about the possibility of interpreting the cell as a semiotic system, he obviously needs to refer to a number of notions that are already existing in other fields of natural sciences, but this is not a problem at all, because it is the *thesis* that needs to be genuinely semiotic, *i. e.* that a cell can be interpreted as a semiotic system, not the whole thing (what is a cell, biologically speaking, is certainly not something that requires semiotic research or terminology).

And then, possibly, the terminology should be semiotic too, because the given essay happens to be addressed to the semiotic community, therefore it is reasonable to use the language of that community, even when it implies re-baptizing a few concepts.

Naturally, an entirely different matter is to browse through all the biosemiotic contributions, and put in a separate box 1) those that are probably not necessary, as they *only* reformulate with different terminology what has already been known for a while; and 2) those that risk exposing biosemiotics to an excessive amount of criticism, given their purely speculative basis, which sounds a bit out of tune in a discipline that after all aims more to improve biology than philosophy. But two factors can be comforting: firstly, the majority of the scholars are still interested in biosemiotics in terms of empirically-based research. If anything, that is a *silent* majority, less glamorous than the fancier metaphysical minority. Secondly, the epistemological debate on biosemiotics is still very open, and has already produced consistent criticism to certain speculative excesses (again, Barbieri’s distinction between code-based and sign-based biosemiotics can be mentioned here).

However, let us dwell a bit more on the debate *empirical vs* speculative, as no impression is meant to be given of despising the philosophical side of biosemiotics:

Of course, one could say that every scientific revolution was preceded by a drastic paradigm shift, but while we are waiting this auspicious event, it would be better, for the sake of biosemiotics, to adopt a line

of empirical inquiry; a line which certainly exists, but is dominated by other discursive orientations. Besides the standards of validations of the contributions among the scientific community, there are also commonly shared resistances of the natural world; observable phenomena, which resist to fit to any existing hypothesis. Abduction and experimentation are the ways to struggle with the resistance of the natural world, and the validity of any new paradigm consists in its “fresh” lead for new abductions and the ensuing confirmations. Poets and ontologists are those who propose possible worlds, whilst ignoring the judgements of facts. (*Ibid.*, p. 401)

Taking this loose edge, precisely on those issues where, on the contrary, a more rigid option is called for may indeed be an issue. On the other hand, generalizations should be avoided here, and one should not forget that biosemiotics, among other things, wants to issue an important statement to the scientific community. That is: are we sure that the whole biological discourse requires only validations of this “rigid” kind? Is biology only about yes/no measurements? The funny thing is, even the sacred laboratory/field scientists have never been so strict as we imagine hard sciences are. Donald Griffin, the one who dealt the fatal blow to obsolete mechanistic conceptions about animal behavior was a zoologist, a pure laboratory/field scientist. Yet, he dared to go on the “loose end”.

Moreover, empirical yes/no observations are hardly autonomous processes. Most, if not all, mathematical or physical theories have departed (in form of either drafts or more articulated formulations) from philosophical speculations, building upon, and of course refining the latter, and often generating additional speculations. Bankov (justly) talks about a monopoly of scientificity over truth. Fine, but that should not mean stubbornness of the former over the existing perception of the latter. Even those scientific findings postulated after Enlightenment with strictly empirical methods were not only preceded, but often challenged and overcome by “better”, or more accurate, reflections (first of all), observations and experiments.

The way fractal geometry challenged and overcame the Euclidean one followed faithfully this sequence. It is fair to say that the name *fractals* came out after Mandelbrot’s work, but where would Mandelbrot be without Poincaré, Klein, Fatou, etc.? And where would they be without Weierstrass? But most of all, where would everybody here be without Mr. Leibniz, and his mere, razor-sensitive, and in fact pre-enlightenment, speculations on recursive self-similarity? Would we still be able to enjoy the pleasant redundancy of Koch’s snowflake without Leibniz’ “loose edge” approach?

More generally speaking, the theoretical unification that biosemioticians are in principle promoting is not meant as an all-together-now, cosmic-solution, let-us-all-be-friends interpretation. On the contrary. It urges us to reflect upon the fact that life contains many more inter-relations than we like to think. The X-*vs*-Y solutions that “normal” semiotics hints (be that Nature *vs* Culture, Body *vs* Mind, Greimas *vs* Peirce...) are the actual over-simplifications: it is when we divide the world in two that we are being superficial. If putting Nature in one box and Culture in another seems to “normal” semioticians the solution to superficiality, then we are really in trouble. Unifying the two (as entities and as concepts) means the exact opposite of reducing them from two to one. It means pluralizing them: it means saying that it is unacceptable to treat them separately, because too many and too complex are the relations between the two. We *cannot* analyze any cultural phenomenon as completely untied from natural contexts.

On the other hand, biosemiotics can be able (and usually aims) to be accurate and “rigid” (this time, in a positive sense) in its formulations. Marcello Barbieri, to mention one, is a passionate supporter of a so-called “Scientific biosemiotics”:

[...] a scientific biosemiotics is within our reach, but [...] we need to use precise definitions and testable models in this as in any other field of science. The fact that such a simple conclusion has been criticized is neither surprising nor upsetting. [...] Biosemiotics is much more than the union of biology and semiotics. It is the long-awaited reconciliation between the two cultures, and this is an issue that strikes very deep, no doubt about that.

At the end of the day, however, scientific biosemiotics is merely the attempt to find out the truth about semiosis with the imperfect tools of science. How semiosis came into being, how it evolved during the history of life and how it eventually gave origin to language and culture. That very culture that today we use to look back, to reconstruct what happened and to understand what made us. Personally I find that the best description of scientific biosemiotics was given not by a scientist but by a poet like T.S. Eliot: “The end of all our exploring will be to arrive where we started and to know the place for the first time”. (Barbieri 2009: 223)

My conclusion in this respect is that there is certainly an absolute need to monitor the excesses of biosemiotics (or any other discipline). But it is also important to circumscribe such monitoring, and not make everybody feel guilty, so to speak. There are certainly biosemiotic approaches that resolve in pure speculation, unsupported by empirical research (or *discussion around* empirical research, which to me is still a legitimate process),

and move in the rather vague area of pansemiotism: to target such approaches is a legitimate concern. On the other hand, one cannot demand *tabula rasa*. Scientific biosemiotics, and particularly zoosemiotics, have a full right to exist, within the semiotic panorama, and in the general scientific dialogue. To deny this means, roughly, to deny a good century and a half of good rigid *and* loose investigations in both humanities and natural sciences.

Conclusion

Perhaps in the light of these controversies, perhaps not, it is fair to stress that the importance of zoosemiotics as a discipline, or even as a simple idea, has not walked hand in hand with its success, within the category of semioticians and other scholars. One cannot really say that the scientific environment has been invaded by zoosemioticians who are anxious to be acknowledged as such. On the one hand, *ca.* fifty-five years of age (as of late 2018, when I am writing these lines) is still not enough to entitle anyone to such statements, neither should we forget that semioticians are still complaining that institutions are refractory to officially “accept” semiotics, the whole of it. On the other hand, in the age of internet, globalization and democratization of knowledge, disciplines can also take few years to spread out and become “viral” (the instant growth of citizen science can be taken as an example here: pioneered in the 1970’s, it is today one of the dominant research areas within social sciences).

Be that as it may, a few considerations are worthy to be mentioned:

1. One visible sign of development is the fact that zoosemiotics, along with other semiotic fields, has been acquiring more and more an ethically-minded approach. Semiotics has probably emancipated itself from the role of a purely descriptive field of inquiry, and it aims at an increasingly relevant prescriptive paradigm. Zoosemiotics seems to be willing to follow a similar route (since the very first introduction of an ethical agenda, in Martinelli 2010: 291-326), often putting a special emphasis on questions related to animal rights and welfare (also, from a strictly formal point of view, *e. g.*, by encouraging the use of such expressions as “non-human animals”, or “other animals”, in place of the demagogic “animals”). The prediction is that this attitude will encounter more and more favour, thus going hand in hand with the general, institutional and scientific, increase of attention towards these issues;

2. More generally, the aspects related to the human/other animal relationship, as analyzed through a semiotic interface (the so-called anthrozoosemiotics), are an increasingly popular interest, among zoosemioticians, and it is quite safe to affirm that the two areas (ethological, that is, the traditional one, and anthropological) are at present occupying almost two equally-consistent places;
3. What has been here called cognitive approach, *i. e.*, the anti-mechanistic and anti-behaviouristic paradigm, is enjoying increasing consensus among zoosemioticians. Most of the current generation of semioticians interested in animal semiosis seems to agree on the existence of a very active mental life in all animal species (each with their own sources and species-specific limitations), that underlies any semiotic action, from the most complex to the simplest one (for instance, one may easily compare the remarkable work by Timo Maran with previous ones focusing on mimicry, to realise how accurately this approach has been developing – *e. g.*, Maran 2005 and 2007). If anything, what changes among zoosemioticians is the methodological motivation: for some, this paradigm seem to be the natural continuation of what is happening already in other animal-related studies (ethology being the most relevant case); for others, the reason is intrinsically semiotic, and relates to the nowadays clear prevalence of Peircean semiotics over the structuralist tradition;
4. With all the due difficulties and contradictions, zoosemioticians has generally acquired confidence to deal with the most critical topics available in the field, namely those that tend to question the human uniqueness in performing given behavioural patterns or possessing given features. Culture, aesthetics, symbolic signalling, and – most of all – language, are all traits whose human species-specificness has been sooner or later questioned from a zoosemiotic perspective. In some cases, aesthetics especially, there seem to be no more doubts, among semioticians, that categories of this type can be – if not easily – justly applied to the semiotic behaviour of other animal species. In some others, language primarily, the question remains open, and the discussion sharp. It is to be predicted that in the future, zoosemioticians will focus more and more often on these issues, also in the light of the new findings coming from empirical sciences;
5. Little by little, zoosemioticians are trying to explore different paths from the ones proposed by Sebeok, whose shadow is sometimes so big that one could be tempted to identify zoosemiotics exclusively with its founder. Although nobody attempts to deny the (justly) unavoidable

importance that the Hungarian-born scholar holds in this field, a few cases exist where scholars are either following other approaches, or even daring to question some of his assumptions as not awfully accurate (Martinelli 2016: 161-192). To interpret it psychoanalytically, such occurrence might be a timid yet clear sign of emancipation: it is the young kid who turns to an age when s/he starts seeing his/her father as not that undisputable hero that s/he used to think he was. In the future, it will be seen whether the adult age will bring even more departures, or alternatively a (total or partial) restoration of the traditional paradigm;

6. In any case, a firm, neat emancipation of zoosemiotics from other fields of semiotics is yet to be achieved. Zoosemioticians are still those strange animals that venture either into biosemiotics congresses (where they might also feel at home, but it turns out to be a huge house that comprises scholars in plants, micro-organisms, genetics, fungi, not to mention increasingly fashionable approaches on the meaning of life itself), or into humanities gatherings where they, brave and lonely, try to challenge everybody else's anthropocentrism (when not, straight away, speciesism) over various issues. Zoosemiotic congresses and symposia are being organized here and there, now and again, but we are still far from referring to these events with words like "tradition" or "regularity" – although, for instance, semiotic communities like the one in Tartu have shown remarkable progress in this respect. Other than to a lack of people, which is still *the* issue, the problem also seems to be related to a lack of organisation. So far, zoosemioticians seem to prefer working on their own (again, with the notable exception of Tartu and few others), rather than enhancing and encouraging interaction;
7. In particular, the apparent ease with which zoosemioticians are happy to be identified as just a special case of biosemioticians is rather tricky to interpret. On the one hand, it is true that being part of a larger community increases the chances of exposure, and – in the specific case – contributes to empower the biosemiotic project, therefore – among other things – improving a condition from which zoosemiotics itself fully benefits from. On the other hand, however, in doing so, zoosemioticians encourage a strongly anthropocentric equilibrium within semiotics that they for first (and together with all other biosemioticians) should reject and fight against, *i. e.*, the implication that all of the nature-related fields should be concentrated in one (no matter how big) single pot, while all cultural areas of semiotics have

a right to enjoy a space of their own. When one, for instance, thinks that a single human body consists of about 25 trillion cells, a number which – alone – is 2,000 times more than the entire human population on this planet (plus, all these cells have direct or indirect connections with each other through more than one modality), it becomes clear that an area like cytosemiotics is at least as entitled as – say – literary semiotics to claim exclusive property of some land.

In conclusion, one may safely say that the big challenge for zoosemiotics, in its next future, is the search for an affirmation of its own identity. It is certainly a discipline with a robust theoretical (methodological in particular) apparatus, but with still too few followers who would be convinced that following this path is any more worthwhile (or sometimes any different) than the ones proposed by such disciplines like ethology or zoology. If biosemiotics, social semiotics, musical semiotics, and several other fields were able to convince a fair number of biologists, sociologists and musicologists that the semiotic approach does actually add something to their own study, ethologists, zoologists, sociobiologists and other categories have so far found nothing particularly different or charming in zoosemiotics, if not in few cases.

The question is, did these scholars ever have a chance to find out? In other words, how often were zoosemioticians able to expose zoosemiotics to colleagues from other fields? The answer, it must be feared, is that these occasions were very few, and, among those few, most of them did not really help, as they either ended up in strong polemics (the most famous instance being Sebeok's harsh rejection of interspecific communication scholars, despite repeated invitations from some of them, like Sue Savage-Rumbaugh, to actually visit their centre and see them working), or in that – unfortunately not rare – presumptuous attitude of semioticians to consider semiotics the ultimate carrier of scientific truth, with the implication that the scholars involved in similar topics, but according to different frameworks, are merely wasting their time.

More humility, but most of all a better organisation and coordination, will certainly lead zoosemiotics to occupy the place it deserves within the scientific panorama.

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