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Indications for a metatheoretic foundation of meaning in biosemiotics. Some philosophical remarks as an introduction to the Gatherings in Biosemiotic 6, Salzburg, Austria, 5-9 July 2006

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Abstract: Biosemiotics is the study of meaning in living systems; it is about context dependent communication and signification on all levels of biological organization. Thereby, biosemiotics perceives the concept of meaning as an essential, non-reducible characteristic of the living world; without it, the latter cannot be understood in a reasonable way. But this position is in conflict with the standard classical stance of natural science (though, of course, not with the one of social sciences). According to this perspective, the idea of meaning can only be considered as a kind of metaphorical use of language (due to our cognitive inability in terms of a complete reduction). This article gives some indications, how biosemiotics can defend and justify its position form a metatheoretic and philosophic point of view. Though, meaning is so evident and, hence, a basically real fact in living systems, we nevertheless need a sound scientific foundation for its argumentation.

Keywords: meaning, communication, living systems, determinism, reductionism, evolutionary novelty, emergence

1 Some philosophical remarks on biosemiotics – an introduction to the 6th Gatherings

There is an old and famous aphorism, at that even one with a religious origin (namely the book Ecclesiastes of the Old Testament); it says: “There is nothing new under the sun.” Now, why do I start my introduction to the tripleC Proceedings of the 6th Biosemiotic Gatherings in Salzburg (5-9 July 2006) with this famous one-liner? For those scientists, who have not yet lost the connection to philosophical reflections concerning their scientific activity (and here I do not hesitate to add in the whole community of biosemioticians), the answer to this question is probably pretty clear. Until today, this saying can be easily interpreted as the standard notion of modern scientific thinking concerning the mode of being of the world, building more or less explicitly upon a strong idea of reductionism. What exists is matter/energy, the laws of nature and cosmic constancies, the latter steering everything in a deterministic way. Hence, there is no becoming, that means, there is no real irreversible time direction and, thus, also no real novelties. Any energetic state, any material constellation that will (has) ever exist(ed) has always been already inherent to some curious initial conditions of this deterministic super-system called “universe”. Our deep human experience of change and novelty is, hence, just a kind of illusion.

On the one hand, as for example Ilya Prigogine has often stressed it (e.g. Prigogine & Stengers 1984), this worldview is basically incommensurable not only with our day to day experience, but also with the empirical evidence that scientists are concerned with (especially that related to the living realm). On the other hand, the reductionist point of view – in all its logical consistency and elegance as well as its operational success – is not only intellectually tempting but also hard to pin down in terms of argumentation. Therefore, and most arguable ever since the developments in modern science since the 19th century, the

question has been arising, whether there is an alternative to this standard worldview of classical physical science; a view that better fits to the empirical evidence and our deep human experience of the world, while still building upon the well proven and established grounds of argumentation according to our modern scientific tradition.

The new scientific field of biosemiotics has to be seen as such a new attempt. On the one hand, it is trying to ad a dimension to science, which is so obvious and evident – at least in the living world – that it just cannot be denied. This dimension can be subsumed under the inconspicuous term "communication"; but if we consider about the word's meaning just a little bit further, we can immediately see that it carries along the whole burden of the deepest unsolved problems of modern western science and philosophy, i.e. the phenomenon of meaning and all its accordant attendants like interpretation, signification, subjectivity, consciousness. On the other hand, as a scientific discipline, biosemiotics has to be built upon the firm grounds of reasonable and empirically based argumentation according to scientific standards. Let us consider now about these two aspects and take a brief general look at developments dealing with the problem of how to combine them on a somewhat modified meta-theoretic level of scientific thinking.

The phenomena of communication and meaning, as the essential characteristics of living systems (Pattee 1982), are of course based on an energetic/material structure and accordant processes that can be described by the basic language of natural science alone. For example, take an essential feature of living systems like autopoiesis. Underlying this concept, there is the idea of a special kind of material structure/organization[1], one – in the simplest case – that is built up by already pretty complex components (macromolecules); these regenerate and realize through their interactions and transformations continuously a network of processes in form of a unity that produced them (Maturana & Varela 1980: 78). Nowadays this can be reasonably described and understood (at least in principle) in terms of the language and concepts of modern biochemistry (just think of autocatalytic networks, hyper cycle models). But does such a basic structural description comprise an essential thing like communication, which is, by all reasonable deliberation, simply a necessary part for a proper understanding of living systems? I do not think so. Thus, by strictly obeying to a strong reductionist perspective alone, i.e. regarding the structural description of physics and chemistry as the only valid language of science, is not enough.

The reason for this is that an additional phenomenon is emerging out of such an autopoietic organizational logic (in the moment such a structure was achieved as a kind of proto-life system for the first time). Usually biologists refer to it as "function", and by it, they satisfy the fact that such a self-referential organization based on mutual interdependent building blocks establish an active, self-sustaining, thus, somehow goal orientated whole (in terms of biosemiotics "function" can easily be translated into "meaning"). My point here is that the formalized language of basic science can only depict the structural aspect but not the emergent ones (regarding life, the latter are function/meaning). Trying to grasp the structures actualized in our universe in terms of ever new and self-organized phenomena, which thereby explore an infinite space of possible organization of morphogenesis in a path dependent way, is thus only one side of the coin. The other is the emergent one, which is grounded on the organizational side, but cannot be depicted by referring to the latter's formal description alone. Hence, relying only on the structural aspects of living systems (e.g. logic of autopoiesis, replication dynamics) only (as done by basic science), is not enough. Higher concepts of scientific description have to be applied in their own right, in order to achieve an adequate understanding of life; they cannot be reduced, because they describe emergent novelties, which exist beyond the structural level represented by the formal language of basic science.

However, if we follow the strong reductionist notion, there is nothing else but fundamental entities involved in a fundamental game of exploring an infinite space of structural possibilities. And science is driven by the aim to define this space in its principle foundations (laws of nature, cosmic constancies),

[1] For convenience, both terms are used synonymously here.

integrating them in a logically coherent final formula, the physicist's dream of the ultimate theory of everything. Thus, all talk of higher level phenomena has to be dismissed as a kind of curiosity (illusion) or shortcoming (cognitive limitation). But I do not agree, because physic-chemical language simply cannot express function and meaning as emergent properties. Hence, in its consequences strong reductionism is highly unsatisfying. Meaning is not only the basic inter-subjective experience that we (as a very social biological species) conjointly build up and which is therefore real in the most fundamental sense, but also underlies all our combined efforts concerning our cultural constructions; thus, including science on a prominent position. Being human is being meaningful, nobody will deny that; at least not when one is referring to her/his day to day subjective experience of being alive. But of course, to dismiss this as a mere physic-chemical epiphenomenon is easily possible by just representing such a notion as an intellectual stance – actually, this is what can be seen concerning the strong reductionist position in science.

But then, how should we proceed when we reasonably cannot deny what lies at the basic of what can be said to be essentially real (communication, meaning, experience, consciousness)? How is this to explain? Where do these features come from? Devine foreordination (as most of our early philosophic and scientific ancestors have argued), notions like élan vital/omega-point/entelechy (as e.g. Bergson, Driesch, Teilhard de Chardin have introduced) or, after all, rather the evolutionary way based on principles of self-organization? Well, the scientific choice is clear, I think; the consequences then as well – communication and meaning is something that once must have come into existence as an emergent property of a special physic-chemical organization and then evolved to ever more complex forms. As such, it is a basic feature of the phenomenon of life in general, found on all levels of its organization, thus representing a semiotic quality deeply inherent to the phenomenon of life per se. This is the crucial assumption on which biosemiotics builds upon.

Evidence for that can be seen in the scientific concepts we have established for the understanding and explanation of living systems accordant to empirical proof. Most prominent, this becomes clear when we refer to the concept of the genetic code. As the editor in chief of the "Journal of Biosemiotics", Marcello Barbieri, has pointed out in the description of the journal: "The origin of life required a genetic code, and the existence of a code implies the existence of meaning." (Barbieri 2007) Thus, we can immediately see that already on the very basis of the phenomenon of life, we cannot escape to refer to something like meaning; and this is not just the case because there is a human natural inclination to an anthropocentric point of view when we try to explain the world (what is surely often the case), but because there is good evidence that this is simply necessary for a proper understanding of living systems.

But as Barbieri mentions, a very strange situation has arisen here, "…because modern science does not deal with concepts like meaning and codes." (Barbieri 2007) Hence, in spite of the experimental evidence for the existence of the code, this idea cannot be considered as real. It is just a metaphor, a linguistic construction in terms of convenience (or also a cutback strategy for dealing with otherwise too high complexity). However, the biosemiotic community does not follow here; for them, meaning and semiotics are real intrinsic characteristics of life in general.

Actually, it is hard to see, how we can avoid the idea of communication and meaning in any reasonable way, when we consider about living systems. Starting with the notion of the genetic code at the very fundament of biochemical biology, climbing up further the hierarchical ladder of the organization of life to the cell and finally up to human social systems – meaning and accordant semiotic processes seem to be deeply built in to living structure. So again, how should this be comprehended? Is it, for example, really just a shortcoming of our limited cognitive capacities, to dismiss the idea of a merely physics-based sociology as ridiculous? Is our fundamental qualitative experience of meaning (as our primary access of conceiving the world) comprehendible in principle by relying on basic physical laws alone? If we doubt that, we agree with the biosemioticians, who consider "meaning", and methods of semiotics building upon it, not only as a legitimate and – for a proper understanding of life – necessary idea, but also as one that has

some autonomy from the mere physic-chemical description of fundamental science (in the sense that a semiotic description cannot be substituted for it).

Then, how can this approach be well grounded on meta-theoretical and philosophic basis, on one that is justifiable according to reasonable scientific standards? How can we argue that semiotic methods exhibit such an autonomy that is necessary for a proper understanding of the phenomenon of life because life is essential meaningful in itself? As I have already indicated further above, a possible solution lies in the modification of modern science with respect to one of its first principles – i.e. reductionism. The case is, we have to open it up for the idea of novelty (as you can see, I am coming back now to the starting point of my short deliberation); but without leaving the well proven standards of scientific argumentation.

This is all but an easy task, as all those know, who have ever thought in some detail about this problem. A main reason for this lies in the matter of fact that we, as scientists, cannot deviate from the general energetic/materialistic foundation of scientific argumentation; there is no élan vital or a special vis vitalis. This position is usually referred to as ontological reductionism; and it is reasonable to obey to it, because it secures us from devoting into mere metaphysical speculations that do not have any longer a connection to empirical grounded and sound reasoning. But then, what is the alternative? Can one represent a materialistic stance[2] that is consistent with the idea of novelty? In other words, can one agree with ontological reductionism but deviate from its stronger forms, i.e. the epistemological (just in principle it should be possible to deduce all higher concepts in science to physic-chemical ones) and the methodological (there is no science beyond physics/chemistry) one? It becomes clear, not to agree with the stronger notions of reductionism is one thing, but to argue such a position on a sound and reasonable basis is another.

However, in the last thirty years or so several distinguished minds of science and philosophy considered about such a modified scientific foundation (based, of course, on all the diverse earlier or more recent precursors and their accordant thoughts). Just to mention a few: Ilya Prigogine, who sees the idea of irreversible evolutionary becoming integrated in his theory of non-equilibrium thermodynamics (Prigogine 1980), Karl Popper, who developed his deliberations about a world of propensities while working on his project of an evolutionary epistemology (Popper 1990), the Harvard astrophysicist David Layzer, whose idea of a fundamental open cosmologic evolution relies upon the argument of a necessarily probabilistic description of the universe (Layzer 1990), the philosopher Mario Bunge, who has worked and recently published a book on a sound explication of the popular idea of emergence and related concepts (Bunge 2003), or Stuart Kauffman, who recently introduced his general concept of autonomous agents (Kauffman 2000); these are able to act on their own behalf and, by this, are not only continuously creating evolutionary novelties by propagating organization but also meaning and value (according to Kauffman's argumentation both things are by no reasonable consideration lying within the reach of understanding by a strong reductionism stance, also not in principle).

As my short discussion only represents an introduction to the tripleC Proceedings of the 6th Biosemiotic Gathering in Salzburg, these ideas and their possible connections to biosemiotics cannot be discussed in more detail now. The concern of this brief initiatory reflection is just to stress the link to the science-philosophic, metatheoretic level. Every scientific field of research needs a sound foundation concerning its basic assumptions, otherwise its stance cannot be argued in a scientifically satisfying way. That has to be said also in the case of the phenomenon of meaning, though its importance and inalienability is simply a fact in our human life-world. Form point of view of social science, meaning has always been the basis of theoretical consideration; else it would be just unthinkable. But as mentioned above, what is fact for social science is as well valid in a much broader and general sense for deliberation on living systems in principle; we neither can reasonable escape the notion of meaning in biology.

[2] What ever this may mean in concrete today; just think about Popper's felicitous remarks that materialism has transcended itself in the course of the unfolding of modern physics (Popper & Eccles 1977, Chapter P1).

But here we find ourselves as part of the natural science segment, which traditionally has had no place for the idea of meaning other than in a simplified metaphorical sense of language usage. This forces biosemioticians to argue their point of view; and this has to include the philosophic and metatheoretic level in a much broader scope than that has been the case in traditional social philosophy. Actually, as has been indicated, this necessarily includes the switch to a fundamental perspective of evolutionary becoming, opening up the possibility of scientific deliberation on the notion of real novelty in our universe. Life, and inherently integrated in it, meaning, have to be considered as such evolutionary novelties. Hence, by adopting the biosemiotic point of view and looking for a sound argumentation for its scientific basis makes biosemiotics also part of this new kind of natural philosophy; one that is based on an explicitly integrative evolutionary perspective, reasonable conceiving the phenomena of our universe beyond the angle of Laplace' s Demon as incidents of an irreversible, non-reducible becoming.

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