

Chapter 2

Is Life Essentially Semiosis?

Peter P. Kirschenmann

Abstract Biosemioticians oppose the dominant physico-chemical molecular-biological approach to life. They regard many, if not all, organic processes as semiotic processes, processes involving “signs”, “information”, “representation” or even “interpretation”. I am rather skeptical or critical about their views. Given the growing diversity of their specific views, I can consider only a few of their ideas, some being all-encompassing, others more detailed. I criticize the global idea that “all life is semiosis” and also the view, used to back up this global idea, that the concepts of function and semiosis are coextensive. Among other things, I suggest that such views confuse means and ends. A related and very intriguing idea is that all biological and psychic processes, as teleological processes, have a quasi-semiotic relationship to an “absent content”. I argue that explanations should refer to actual, present factors. Another proposal, which is meant to avoid bothersome questions of where there could be interpretation in “biological semiosis”, is to regard biological processes like protein synthesis as “manufacturing semiosis”. I oppose this view as well as the other biosemiotic views with my own ideas about emergent forms of structural determination and co-determination in biology.

Keywords Absent content • Biological function • Biosemiotics • Code(maker) model • Emergence • Genetic code • Life • Manufacturing semiosis • Protein synthesis • Structural determination and co-determination

Introduction

Part of the spirit of our 2012 conference location, to wit the so-called Copenhagen-Tartu biosemiotic school, invites a philosophical evaluation of the ideas of biosemioticians. We all know the importance of the workings of the genetic code for life, and the importance of all kinds of signaling processes, like those in nervous systems, for many organisms. Biosemioticians regard such and many other organic processes

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as semiotic processes, processes involving “signs” and “symbols”, “information”, “representation” or even “interpretation”. Rather generally, they oppose their views to the dominant physico-chemical approach in molecular biology, which for them involves an “asemiotic conception of life as mere molecular chemistry” (Kull et al. 2009). Given the growing diversity of their specific views, I can consider only a selection of their ideas. I shall present somewhat skeptical considerations regarding both their more detailed and their more far-reaching ideas. And I shall present my own ideas about structural determination and co-determination in biology.

A Confusion of Means with Ends?

For a number of biosemioticians, who frequently have been adopting a philosopher’s role rather than that of a biological specialist, life is “semiosis”, “signification” and “communication”. If this is supposed to be definition of the essence of life, my admittedly *very general* first comment would be: this global definition cannot be satisfactory for the following reasons. Universal characteristics of life rather are self-maintenance, growth, reproduction and – if one wants to add a general evaluative term – thriving as a living being. Important biological coding and signaling processes, just like metabolic processes, are amongst the *ways or means* of realizing such goals. Yet, in that sense, they certainly do not constitute the essence of life.

Biosemioticians might retort that they are not interested in defining the complete essence of life, but in giving an answer to questions of the difference between non-living matter and life. Marcello Barbieri ends one of his biosemiotic statements (Barbieri 2008) by stating “there is a deep truth in the oversimplified statement that ‘life is semiosis’”. All this emphatically indicates the task of giving alleged semiotic processes in biology their proper places and specific, non-simplified, conceptualizations.

Semiosis and Biological Functions

Biosemioticians have elaborated and articulated semiotic ideas in often rather different ways. In view of this diversity, some leading biosemioticians obviously have felt the need to formulate a number of common theses (Kull et al. 2009). One (meant to support the global definition above) is that the concepts of function and semiosis are coextensive. Both are said to be teleological, determined by an “end”, a specific “absent” content.

Surely, functional analyses and explanations, like those of coding or signaling processes, are part and parcel of biological research, even though the question of the right philosophical account of biological function is far from settled

(cf. Kirschenmann 2009). A great many functional explanations can be said to specify interdependencies between traits, behavior and environment, appealing regularly to counterfactual reasons. For example, concerning the advantage of a blood circulatory system, one relevant consideration is that mere diffusion of oxygen and carbon dioxide would not work for organisms of the size of vertebrates. A nice further example, regarding behavior, is the explanation of why electric fish swim backwards. Only in doing so, can they successfully scan a prey with their electric sense, which does not provide much focus. Such answers are *explanations of their own kind*, clearly marking biology off from physics and chemistry, clearly different from deductive-nomological or causal explanations in those fields. They are explanatory in that they show how a trait or behavior fits into the structure of functional interdependencies within organisms and of organisms and their environment.

Yet, the two examples are enough to show that functional explanations need not turn on semiotic considerations, even though further details of the function of traits or behavior concerned may, for example, include signaling processes. In short, the concepts of function and semiosis are *not* coextensive. Most functional structures and behavior can hardly be said to “represent” their effects.

The “Absent Content”

The above-mentioned idea of an “absent content” or a “constitutive absence” is a challenging philosophical idea. It is due to Terrence W. Deacon, who has incorporated it in his recent grandiose sketch of the emergence of life and also mind (Deacon 2012). Its overall architectonic idea consists of a hierarchy of dynamical regimes – homeodynamics, including thermodynamics, morphodynamics (“self-organization”), teleodynamics – interacting and building upon each other, with ever more constraints becoming effective.

The most characteristic example of an “absential relationship” on the highest teleodynamical level, for Deacon (2012: 24ff), is purposeful human activity, since its goal is *not* (yet) physically present. In that sense, for him, purpose is intrinsically incomplete, dependent on something extrinsic and absent, the goal. Similarly, information, function, meaning, representation, intention, consciousness, relevance and value exist for him only in semiotic relations to something they are *not*. This also holds for him for the biological counterparts of such notions, counterparts which do not involve conscious or psychological states.

In such terms, Deacon (2012: 42ff) pleads for a fundamental shift in perspective: while a traditional idea has it that life and mind must involve something *more* than mere physics and chemistry, his proposal is that they are *less*, since they always depend on something specifically missing, *not* physically present.

The “absential relation”, for Deacon, need not be an orientation towards an end or consequence; it can also be a relation to something abstract, potential or

hypothetical. Thus, for example, he considers the Shannon information of a message as being determined by the probabilities of all the possible messages *not* sent (Deacon 2012: 378ff).

Architectonically, Deacon ties “absent contents” to constraints on the behavior of organized dynamical systems, as constraints restrict (or render absent) the degrees of freedom of such systems. Undoubtedly, living organisms abound in constraints of a great diversity of forms. For example, blood vessels constrain the flow of blood, so that it can supply all cells with nutrients and oxygen. Of course, one can, perhaps equivalently, say that blood is prevented from flowing in all the possible ways that it would do without blood vessels: that the actual flow of blood is determined by those absent possibilities.

I would prefer to describe and explain biological matters in positive terms regarding what is present. Also, in the case of human purposeful activity, I could agree that the goal is not yet physically present, but I would hold that it certainly is mentally present in the actor. In sum, Deacon would have to show more clearly how approaching biological and psychic phenomena in terms of “absent contents” has specific explanatory advantages.

Manufacturing Semiosis

Biosemioticians are aware of the difficulties of identifying something like referents or meanings of signs in biology and identifying some agency interpreting such supposed signs. Because of these difficulties Marcello Barbieri (2008) has come up with the proposal of applying, instead of a Peircean semiotic model, a “codemaker model”. His idea is that just as human “codemakers” create signs and meanings with *conventional* coding and the interpretation of relations between them, so ribosomes, for example, take gene sequences (“signs”) as sequences of particular codons to *produce* proteins (“meanings”). Thus departing from the requirement of interpretation, the author regards protein synthesis to be a case of “*manufacturing semiosis*”.

Now, it certainly is odd to call a *manufacturing* process a “semiotic process”. Barbieri (2008: 43) offers a nice argument, supposed to convince us that one indeed can speak of “signs” in protein synthesis:

The existence of signs can be recognized by the fact that they are ‘agent-dependent’ entities, because they exist only when an agent (a codemaker) treats them as signs. This makes us realize that in protein synthesis the codons of a messenger RNA are true signs. If the nucleotides were scanned two by two, the codons would be completely different, which proves that they are not objective properties of the RNAs. Codons are codemaker-dependent entities, and have therefore the qualifying feature that defines all signs.

This abstract consideration is all right, as far as it goes: if scanning two by two, instead of three by three, were to be seen as a sort of rather arbitrary human convention. Yet, scanning two by two would not have the function of leading to the production of appropriate proteins, and it would not do so for non-semiotic reasons.

Protein synthesis, after all, is a very complex process, depending also on numerous gene regulations and repair mechanisms. (Knowledge of these, by the way, is being used in combatting viruses.)

Structural Determination

Biosemioticians view their approach as the necessary alternative to a conception of life as mere molecular chemistry. Yet there are other alternatives. In protein synthesis, the structure of DNA and mRNA, given the appropriate gene regulations, determines the structure of the resulting proteins. This *structure determination* is not a plain chemical process: it constitutes an *emergent* level of determination, but not a particularly semiotic one. Since protein synthesis depends on numerous factors in the cell, it might be more appropriate to refer to the contribution of DNA and mRNA as “structural co-determination”. One particular type of structural determination is signal determination (cf. Kirschenmann 1970), which surely is important biologically, and which is also present in technical information transmission and processing.

Biosemioticians are aware of, and argue against, the objection that their proposals are mere metaphorical redescrptions of biochemical processes. No doubt, the discovery of emergent structural determinations through the idea of a “genetic code” or the results of studies of specific biological processes as “signal processes” are great scientific achievements. My impression is that biosemiotics, because of its predominantly redescriptive character, has not been able to match such achievements. For example, viewing a genetic code as a “representation” of the environment, because it helps to bring about adaptive phenotypical traits, to my mind adds nothing to calling them “adaptations”.

Conclusion

Quasi-semiotic processes have many biological functions, but are not the essence of life. Rather, diverse forms of structural determination and co-determination, often hierarchically ordered, are characteristic of all forms of life.

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