

LIFE, TEMPORALITY AND SEMIOSIS: THE PLACE OF BIOSEMIOTICS WITHIN GENERAL SEMIOTICS

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ABSTRACT

I would like to present some new perspectives on the reciprocal foundational links which are discernable between general semiotics, anthroposemiotics and biosemiotics. To that end I offer an examination of the peculiar place occupied by temporal relations within the relational framework of semiotics. I support these considerations by drawing on previous work about a relational standpoint presently emerging as a unifying perspective within diverse fields of inquiry (biology, quantum physics, philosophy of science, mathematics), which I have previously characterized as a "relational turn."

A common, positive feature of these developments is the recognition of the relational nature of physical reality. This portends an implicit repudiation of the traditional nominalistic bias of the natural sciences and removes a long-standing obstacle to the acceptance of semiotics. Until recently these new approaches have only considered relations of a dyadic nature, or their dyadic combinations.

I argue for the need to supplement the Peircean elucidation of semiosis in terms of triadicity with other equally unique relational features, which I characterize as "radical temporality" and self-reference. A brief sketch of the different roles played by relations of temporality in organisms in general (biosemiotics) as opposed to in organisms immersed in a historically constituted culture of symbols and artifacts (anthroposemiotics) serves to disclose the relations of mutual epistemic dependence that underlie these disciplines.

Key words: biosemiotics; temporality; semiosis; relationality

Of time and signs

We are here together to think about time and semiotics. We have travelled to this place to be here at the same time and interact, as we say these days, “in real time.” We are able to do this because all our “nows,” your nows and mine, are synchronized – we are all simultaneously here. Aristotle can share his thoughts with me but I cannot share mine with him because his present and my present cannot be thus synchronized.

We can change our spatial location with ever-increasing efficiency and speed but we are **absolutely powerless** when it comes to temporal location. We cannot revisit past nows, except in our imaginations. And the only way to visit future time locations is to wait until we inexorably arrive at them as future presents—provided our own expiration dates don’t transpire first.

This metaphysical factum is not just the abiding lot of humans; it is the lot of every organism, from bacterium to zebra. Inanimate things, shoes or planets, do not have intrinsic nows. They are given relational nows by organisms that relate their presence to the organisms’ individual presents by means of natural or artificial clocks. Organisms partake of both types of temporality; they have intrinsic nows and are also given relational nows by other organisms, at a par with inanimate objects or events.

Having an intrinsic now is a peculiar form of temporality shared by all living forms. But we humans, who not only use signs but come here to think and talk about signs by means of second-order signs, are in this respect very different from all of the other organisms we know. On this occasion I would like to explore the way in which the unique characteristics that distinguish us as meta-semiotic beings may have a correlation in the way our immersion in temporality differs from the intrinsic temporality of non-human organisms. Using Sebeok’s terminology, this can be described as an exploration of the role played by

different forms of temporality in characterizing the mutual interrelations that span the domains of anthroposemiotics and biosemiotics.

Establishing a foothold for achieving this elucidation requires a clear idea of temporality's place within semiosis. One promising start may be to draw a characterization of temporal relations in terms of their similarities and differences with respect to those of other relational forms—especially spatial relations. On this basis we may gain an insight into those types of temporal relational structures that are in fact constitutive of semiosis.

Before examining temporal relations, it seems advisable to preface our task with a brief account of some current views on the nature of relational structures, as they are manifest in the natural world and concomitantly in our theoretical representations of that world.

A relational turn in science and philosophy

There is a remarkable trend arising concurrently and independently across previously unrelated disciplines which I characterize by the expression “relational turn.” I am referring to an emergent shift of attention away from objects and things and towards **relational structures and processes**. It embraces relationality both as the central target of experimental research and as a basic feature of the conceptual instruments used in explanatory modeling and theorizing. This emerging inclination to give preeminence to relational structures over and above their individual relata is now discernable throughout several fields of investigation, including biology, the philosophy of science, physics and mathematics. Let us briefly survey the main features of these developments.

- **Biology.** In biology this trend is most prominent in the current rise of **systems biology** across the entire range of the life sciences. During the last two decades the application of increasingly sophisticated research

technologies to molecular biology and other sub-disciplines has yielded an unmanageable mass of experimental data. The need for a more holistic approach, filtering out irrelevant details, has sparked a renewed acceptance of relational approaches aimed at discerning recurrent patterns within the pool of experimental data.

Systems biology is a theoretical approach that resurrects some earlier conceptions of relational biology and cybernetics that were once deemed too abstract or speculative for experimental application. Thanks to the employment of methods made possible by new computational, modeling and simulation tools, these ideas are now having rewarding applications. In contrast with traditional reductionist perspectives, in systems biology there is no privileged level of functionality—neither within individual organisms nor within the systems that they together constitute. The wholes act on their various parts, and these parts in turn act in a circular manner upon the whole. ¹

- **Philosophy of science.** A currently important school in the philosophy of science is **structural realism**. It spans a range of related positions that focus on the role of **relational structures** (nexuses of relations), both in nature and in our scientific accounts of nature. According to several of these views, the ontological claims of a scientific theory are exhausted by the structural web of relations that it attributes to the world. These positions develop and update the arguments of several 19th and 20th century thinkers, such as Poincaré, Duhem, Weyl, Russell and Cassirer, whose ideas are closely associated with the importance of focusing on relational notions. Current directions in structural realism stem from a seminal article written by Worrall (Worrall 1989). Ladyman 2009 offers a comprehensive review of these positions.

- **Mathematics. Category theory**, a major development of 20th century mathematics has created relational structures that interconnect mathematical sub-disciplines and espouses a relational alternative to set theory in the foundations of mathematics and its philosophy.
- **Physics.** In the last two decades, the rise of relational interpretations of quantum mechanics is one of the most remarkable novelties in the foundations of physics. There are several different relational interpretations that originate from diverse standpoints, but they seem to converge into similar basic solutions to the notorious interpretational problems of quantum physics. They agree in subordinating the notion of individual physical objects to the higher concept of relational systems, where physical states can be said to exist only in relation to other states. The ultimate elements of physical reality are thus the **relations of interaction between systems**, instead of some ontologically preexistent individuals. This represents a remarkable albeit tacit repudiation of the Ockamist nominalism that often lurks behind modern science.² There is an excellent review of major issues and positions in Laudisa and Rovelli 2008.

Time, semiosis and relationality

Peircean semiotics is also based on a relational view of reality. Although harmonious with the approaches we have succinctly reviewed, this conception takes relationality one important step further. It draws a sharp distinction between two different kinds of relationality, based on the contrast between dyadic relations and triadic relations, as instances of the categories of secondness and thirdness. None of the relational positions previously outlined considers relations of higher order beyond dyadic relations or their (dyadic) combinations. I believe we need to sharpen and enrich these distinctions in order to integrate semiotic theories (at least those of a Peircean orientation) into the fold of other relational approaches.

Semiosis, together with laws and habits, is a typical example of irreducibly triadic relations. It seems remarkable that semiosis, laws and habits also share two other distinctive characteristics: they involve **radical temporality** and **self-reference**. Moreover, these two features appear to be logically interconnected, as was shown by George Spencer-Brown (see Spencer-Brown 1979).³ Peirce, somewhat obliquely, pointed to these two characteristics of semiosis, but apparently did not succeed in developing his thought more fully. Given the brevity of this presentation, I will leave self-reference for another occasion and concentrate on temporality.

By “radical temporality” I indicate the presence of time relations that cannot be mapped onto spatial relations without significant distortions. Even the customary depictions of physical processes by means of static diagrams tend to conceal the dynamic nature of the phenomena. The dynamic aspect is obscured because the asymmetry of before-after relations, which mark the irreversibility of time, is obliterated through the simultaneous presentation of their relata. This tendency to translate temporal relations into spatial ones—Bergson called it “spatialization”—seems innate to our visual habits of attention and conceptualization. The loss of visualization in the passage from classical to quantum physics bears witness in history and pedagogy to the extreme difficulty we encounter when grasping relations in non-spatial terms.

Peirce correlates the three relata in semiosis, the representamen, its object and its interpretant, with the three “dimensions” of time. Present time corresponds to the representamen, past to the object, and future time to the interpretant. The present is the infinitesimal cross-section that separates the future realm of possibilities from the facticity of the inalterable past.

A sign does not exist at any particular instant, just as motion does not exist instantaneously. In analogy with motion I think that semiosis is **radically temporal**. By this expression I mean that the sign’s three relata cannot exist simultaneously in the way that spatially individuated objects coexist in space.

Peircean semiotics and temporality

Peirce conceives time as an existential analogue of the logical flow from premises to conclusion. This in turn he regards as a generalized evolutionary development of the semiotic flow from object to interpretant.

The idea of time must be employed in arriving at the conception of logical consecution; but the idea once obtained, the time-element may be omitted, thus leaving the logical sequence free from time. That done, time appears as an existential analogue of the logical flow. 1.491

This conception is supported by a sort of instinctual recognition:

It is true that we know the conclusion later than we know the premisses; but we do not so much think of our knowledge as following as we do that one fact is logically sequent on the other. The instinct may, therefore, be presumed to be an obscure perception that temporal succession is a mirror of, or framework for, logical sequence. Thus instinct with its almost unerring certainty favors this doctrine. (CP1. 496).

For Peirce time is "...that diversity of existence whereby that which is existentially a subject is enabled to receive contrary determinations in existence." ⁴ That is, according to the law of non-contradiction in logic, **a** and **not-a** can both designate true propositions, **but only at different times**. Space, on the other hand, performs the symmetrically opposite job:

"According to the metaphysical law of sufficient reason, alike in all respects two things cannot be. Space evades that law by providing places in which two things ...which are precisely alike, except that they are located in different places... may exist. Thus, **space does for different subjects of one predicate precisely what time does for different predicates of the same subject** [my emphasis]". CP 1.501.

As we have seen, Peirce approaches the mystery of time from the vantage point of logic. But in his mature conception logic is nothing but formal semiotics.

Consequently, to further expand the Peircean understanding of semiosis we should inquire into the relationships between temporality and semiosis. **It seems that there cannot be semiosis without time** but, we can ask ourselves, **can there be time without semiosis?** Or perhaps: **is it the case that both temporality and semiosis are manifestations of something even more basic?**

It would be preposterous to address the full import of these trenchant and fundamental questions within the limits of this short exploration. Nevertheless, it seems important to raise them, because they motivate and guide this attempt at expanding our understanding of the relational structure of semiosis by going beyond its characterization in terms of triadicity.

Semiotics and human temporality

If semiosis is intimately connected (if not identifiable) with temporality, it is reasonable to suppose that the study of temporal relations may shed some light on the different ways semiosis manifests itself at successive stages in the evolution of life.

Of all the major evolutionary transitions (e.g., from prokaryotes to eukaryotes, from unicellularity to multicellularity, etc.) the most recent and radical for our purposes is the one that created human life. All organisms are historical and in a sense social,⁵ but we are conjointly social and historical in a new and unprecedented dimension. We are organisms immersed in a **historically constituted** culture of symbols and artifacts which each new generation enriches and expands, adding to the creations and discoveries of previous ones. We exist and survive through a communion granted by a collective external memory made possible by the meta-semiotic novelty of language.

As individuals we are reflectively aware of our intrinsic temporality by having been brought up in the midst of myths and chronicles and by the collectively articulated knowledge that we were born and will die. Each one of us is but an

evanescent node in the immense web of semiotic and practical relations in which we are temporally participant. Animals use symbols to a limited extent but human language is superabundant in concepts and other conventional symbols distilled through a long historical process of social interaction. I would like to relate the novelty of human language to that of human temporality.

Human temporality is a self-reflective temporality. Like all other organisms we are in time, but unlike all others we can tell time; we can say "now" and use external clocks. At this very moment we are occupying our time in thinking and talking about time. Our unique self-individuation as "selves" is somehow rooted in the pre-reflective intrinsic temporality we share with all other sentient beings. We are able to take distance from ourselves and lift ourselves above this pre-reflective temporality by means of the meta-semiotic powers of conceptual thought.

To explore the connections of anthroposemiotics with its biosemiotic basis, we need to clarify the nature of human temporality beyond these sketchy remarks. To this aim I believe it is imperative to extend and develop Peircean semiotics to include insights gained by other philosophical traditions, such as those of phenomenology and hermeneutics (including Heidegger, Merleau-Ponty, among others) and the more recent developments of enactivism (including Bateson, Varela, among others).

Heidegger thought that in one sense we (each of us) *are* time. Quite independently the poet Jorge Luis Borges expresses a similar realization in a famous quote:

Time is the substance from which I am made. Time is a river which carries me along, but I am the river; it is a tiger that devours me, but I am the tiger; it is a fire that consumes me, but I am the fire. (Borges 1964).

If we join Peirce's dictum "man is a sign" to this realization we may come close to identifying temporality and semiosis, or perhaps to a perspective where their outlines are scumbled against the background of an even deeper and more basic conception.

In conclusion

Within general semiotics, the mutual interdependence of biosemiotics and anthroposemiotics is somewhat similar to that of quantum and classical physics, both conceptually and historically.

In physics we have access to the quantum world only through the mediation of classically conceived apparatuses and the classical concepts embedded in their construction. Through their employment we disclose a world in which those very concepts prove inadequate. After finding new, adequate concepts we then seek to retrieve the classical world (through decoherence or some other means) as emergent from its non-classical substratum.

Analogously, in semiotics we have no choice but to start with the semiotic realm in which we are immersed— that of human language and the science of semiotics itself. To here we will return after travelling to the biosemiotic depths of cells and organelles, in order to grasp the elemental semiotic transactions from which anthroposemiotic structures have at long last emerged.

The current relational turn in biology and physics seems to indicate that this two-way journey from the more complex to the simpler and back can best be undertaken by focusing on relational structures and by disentangling the nets of relations that appear at different levels from the nets of relations that link one level with another. I am here advocating a similar approach in semiotics.

As an example of how to implement this approach I propose the study of temporal relationality in semiosis. The cursory remarks I have advanced here are only some preliminary steps in that direction.

Notes

1. Hundreds of papers and many books are published yearly on systems biology. Noble 2006 is a very readable, non-technical introduction.
2. The denial of the reality of relations or, at best, its subordinate status to the reality of their individual relata has been one of nominalism's most enduring positions. From its medieval beginnings through its reception and elaboration in 17th-century natural philosophy the subsistence of entities after the annihilation of their relations was considered a guarantee of their reality. Ockham and other 14th Century *terminists* applied the "principle of annihilation": real things are those that could be created independently of any other thing, and would survive the annihilation of everything else in the universe (*toto mundo destructo*). (See e.g. Funkenstein 1975, 1986).
3. The interrelations of temporality and self-reference together with their logical, mathematical, physical, biological and philosophical implications have been studied by numerous authors (see e.g. Kull 1997, Goudsmit 2007, 2009, Fernandez 2009, Varela 1979; Kauffman 1987, 2002, 2005). Some have connected them with the need to employ imaginary numbers in temporal representations (e.g. Kauffman 1987, 2002, 2005) and with the action of feedback loops in computational and biological circuits (e.g. Thomas and Rössler 2006).
4. Time is "...that diversity of existence whereby that which is existentially a subject is enabled to receive contrary determinations in existence. Phillip is drunk and Phillip is sober would be absurd, did not time make the Phillip of this morning another Phillip than the Phillip of last night. The law is that nothing dyadically exists as a subject without the diversification which permits it to receive contrary accidents. The instantaneous Phillip who can be drunk and sober at once has a potential being which does not quite amount to existence." CP 1.496 (1896).
5. Authors in the phenomenological tradition (Heidegger, Merleau-Ponty and others) have some very insightful observations on the differences between humans and other living beings, but unfortunately they tend to think of animals as if they were quite representative of organisms in general. Furthermore, they focus on the lonely animal without realizing that animals exist within a sociality of sorts, even if quite different from human sociality. This has been noticed and criticized from different perspectives (see e.g. Morris 2005, Kawade 2009). Morris quotes Kym Maclaren on Bateson's views on animal sociability: "Gregory Bateson has argued that the rituals, for instance, that two dogs enact in meeting and greeting each other are not instinctual in the sense of being pre-programmed and automatic. The rituals are rather a matter of the two dogs *expressively and intercorporeally determining the situation, and working out a shared world*. Animals, Bateson asserts, cannot use negations. They cannot say "I will not bite." What they do, instead, is they act out a kind of *reductio ad absurdum*: they *play* at biting and fighting, for instance, in order to reveal to each other that "it is biting that I am not doing." In this way, they "discover or rediscover friendship." Through an intercorporeal dance, they bring to expression a situation in which each is confirmed as the friend of the other." For an insightful *aperçu* of Bateson's thought see Harries-Jones 1995.

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