

Biosemiotics

Biosemiotics is the thesis that the essence of biology involves the creation, processing, and communication of information, in the form of a *language* that uses arbitrary symbols, inside cells, between cells, and between all organisms and their environment.

Information philosophy sees a continuous evolutionary development from the earliest communications inside cells over three billion years ago to the creation and communication of information by human beings today. When we say that information philosophy goes “beyond logic and language” we mean that many philosophical problems are not soluble with the particular human inventions of logic and languages today.

All life uses negative entropy for its maintenance and information as a guide to action, representing a repertoire of behaviors. All living things are communicating with signs. Biosemioticians believe that semiosis is coextensive with life.

We can define semiosis (Greek: σημείωσις, *sēmeiōsis*, from σημειῶ, *sēmeiō*, “to mark”) as any form of activity, conduct, or process that involves signs, including the production of meaning.¹ The term was introduced by CHARLES SANDERS PEIRCE to describe a process he called semiotics that *interprets* signs as referring to concepts and objects, about the same time that GOTTLIB FREGE studied denotation and meaning.

We see this essential nesting of concepts.

Information>Biology>Communication>Language>Semiosis

In language we include syntax, semantics, pragmatics, morphology (graphology and phonology, but also smells, tastes, touches, as well as emotive expressions, body “language,” sub-linguistic communications to the “mirror neurons” in others, etc.)

Even though intra- and inter-cellular communication using multiple molecules over diverse pathways is getting better and better understood, biologists have remained wary for decades of accepting the idea of “information” in biology, with its connotation

1 See chapter 11.



of a conscious intentional sender “informing” a conscious interpretational receiver. Quantum physics too is plagued by concerns over the role of “conscious observers.” And of course philosophers do not yet use information as a tool for philosophical analysis. The philosophy of information is not information philosophy, just as the philosophy of language is not analytic language philosophy.

If we define “conscious” as being aware of incoming information and reacting to it with behaviors/actions that indicate the information is being interpreted and used correctly, we have a very broad definition of mindfulness that can apply to almost the whole of biology as well as to the computing and communicating machines that humans have built.²

Will Biologists Accept Biosemiotics?

Biosemiotics is as legitimate a science as bioethics, bioinformatics, biolinguistics, biomathics, and code biology, to name a few at the boundaries of biosemiotics. The established professional societies in each of these subdisciplines, with journals, international meetings, etc., are signs of a Peircean open community of inquirers that is the hallmark of a science.

The greatest barrier to acceptance of semiotics in biology may be the devotion of biosemioticians to the work of CHARLES SANDERS PEIRCE. Peirce’s great contributions to logic and science are extraordinary, but he sometimes produced nonsense, wishful thinking that some of his ideals are actually in the world.

Peirce’s greatest mistake was his triadic analysis of 1) thesis and firstness of Tychism/chance, setting it “over against” 2) the antithesis and secondness of Ananchism/necessity. The ultimate blow was his Hegel-inspired 3) *Aufhebung* and thirdness of Synechism/continuity, his perhaps deeply Christian hope for “evolutionary love” to blunt the “greedy” nature of chance in Darwin.

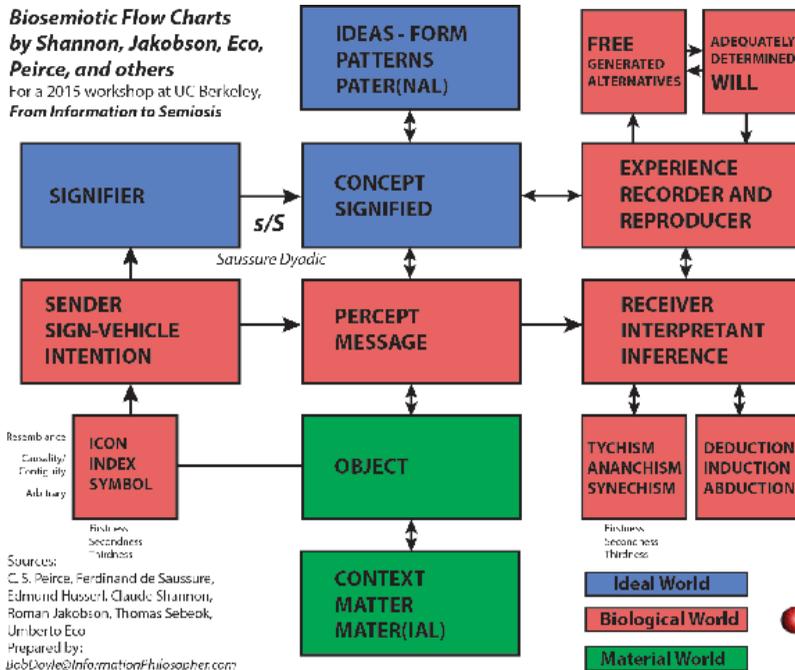
Biosemioticians need to decide between being disciples of Peirce or a subdiscipline of biology. FERDINAND DE SAUSSURE’S dyadics may fall short of Peirce’s interpretant, but as a linguist he was as great as Peirce and his move to synchronic structure as

² See chapter 14 on consciousness.



a diagnostic tool to understand diachronic function and his great insistence that signs (symbols) are arbitrary inventions may be as important for communications in molecular biology as Peirce's insistence on interpretation.

Indeed, signaling in biology generally has very little interpretation in the sense of Shannon's entropy/uncertainty before a message is received, which becomes information after receipt. This is because evolution has for the most part reduced the message "possibilities," for example with an artful combination, perhaps left over from the RNA world, of editing in advance of protein creation (especially in eukaryotes) and aggressive "error" detection and correction afterwards. A major task for biosemiotics is to find specific examples in biology of signaling as signing, i.e. with interpretations of the sign. Examples in the case of a neurotransmitter being interpreted - in a *context*, which ROMAN JAKOBSON³ added to Shannon's information communication - in more than one way. We can summarize the foundations of biosemiotics in the form of a flow chart.



3 "Linguistics and Poetics," in *Style in Language*, ed. T. Sebeok, 1960, p.350

