

Cybersemiotics, a transdisciplinary view on communication, information, signification, and cognition

Commentary

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Abstract: The present commentary addresses cybersemiotics, a transdisciplinary theory of communication, signification, information, and cognition which is based on the work of Danish scholar Søren Brier. Cybersemiotics is a metatheory that encompasses the research programs of information theory, first and second-order cybernetics, Luhmann's systems theory, cognitive sciences, Peircean biosemiotics, pragmatic linguistics, and language game theory. I will explore some of these theoretical frameworks and how cybersemiotics integrates them.

Keywords: cybersemiotics, information, communication, signification, cognition.

Cybersemiotics is a conceptual framework that aims to generate a non-reductionist and transdisciplinary view on knowledge that allows the interaction of different types of knowledge in a non-ideological way, to develop a new vision of cognition, signification, information, and communication in their relationship with culture, nature and our bodies. This proposal has been developed by Danish scholar Søren Brier for more than three decades now and my interest in this short commentary is to highlight some of its main arguments. In this sense, according to Brier (2008: 22), the starting point is Norbert Wiener's cybernetics in the 40s. Since then, scholars have been searching for a consistent information science capable of extending their methods and knowledge production to the domain of cognition and communication. They hoped to find a scientific approach to the relations among human beings, machines, culture, and nature that reaches beyond the realm of classical science. Some of the first attempts in this direction were comparative psychology and behaviorism, however, with the development of artificial intelligence (AI), behavioral sciences, and neurosciences, the path of behavioral planning and programming took a new direction that would eventually lead to the development of cognitive sciences and the information processing paradigm. This paradigm has been based on an objective concept of information but, rather than

following the route proposed by Shannon, what has been followed is Wiener's statistical negentropic information concept and Boltzmann's entropy concept.

This research program has made progress in conceptualizing and dealing with the internal, external, and social realities of living systems in such a way that knowledge representation becomes compatible and manipulable by computers. The goal has been to explain qualia, life, and consciousness as emergent phenomena resulting from the evolution of material, energetic, and informational systems. However, this research program also has some problems and difficulties that arise when it comes to modeling the semantic dimensions of language, perception, and intelligence on the one hand, and the understanding of the influence of those dimensions on cognition, communication, and action, on the other. An alternative to this approach has been Konrad Lorenz and Niko Tinbergen's science of ethology, which creates a biological theory of innate cognition and communication based on an evolutionary theory of instinctive motivation, perception, and action, a theory inspired by the *umwelt* theory of Jakob von Uexküll. This theory also inspired the Danish biopsychology of Iven Reventlow, who turned out to be Brier's mentor and a great influence on his work. This is the moment when Brier turned his attention to Gregory Bateson's cybernetics,

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Maturana and Varela's autopoiesis theory, and Heinz von Foerster's second-order cybernetics in search of a broader foundation. "Second-order cybernetics defines information as something that an observer notes as internally created in an autopoietic system and that has formed structural couplings in reaction to perturbations from the environment" (Brier, 2018: 24). This approach moves away from those objectivistic, denotative, and logical theories of information and language since it moves towards more constructivist theories. Second-order cybernetics and autopoiesis theory focus on the individuality of an observing system.

However, these approaches also have limits. They have problems explaining meaning and meaning emergence in living systems, basically because the basis of second-order cybernetics is still logical discrimination and the computation of differences. This is why Brier turns to Niklas Luhmann's systems-theoretical model of social communication, mainly because Luhmann integrates the bio-cognitive approach of second-order cybernetics with the autopoiesis theory of cognition (or what Maturana and Varela named the "biology of cognition") from where he proposes that cognition and communication must be studied as phenomena based on three independent systems of inquiry: the biological, the psychological, and the socio-communicational (including their mutual interpenetrations). These are three systems of qualitatively different natures, they are closed to one another, and can only communicate through interpenetration. For Brier (2008: 26), since Luhmann's theory is based on Spencer Brown's dualistic philosophy of differences, this makes it compatible with the triadic semiotics of Charles S. Peirce, a theoretical framework that provides a transdisciplinary theory of meaning and signification that is not contemplated by the cybernetic-functionalistic informational approaches.

Peirce then represents an alternative to the mechanical and deterministic view proposed in classical physics, since he argues that nature has spontaneity and pure chance as its basis in Firstness, and it has reasonability in the category of Thirdness. In Peirce's pragmatic and evolutionary semiotics, phenomenology is integrated with the triadic theory of semiosis, from which he denies Kant's distinction between the phenomenological and the noumenal, understood as the thing in itself, because this idea of the incognizable appears as a null-term of theoretical and practical thought. For Peirce, the real is something fully open to our pragmatic observation and thinking and there is no absolute difference between objects of theoretical and practical thought. Thus, Peirce makes full naturalization of all kinds of knowing in the universe possible, including the subject and intersubjective phenomena. Peirce's semiotics contemplates a sign vehicle or Representamen, an Object, and an Interpretant, which is a more developed sign in the mind of the perceiver, the observer, the communicator or, in short, in the mind of 'someone'. For Brier (2008: 27), each of these three is a kind of sign and is necessary to create

cognition, information, and communication, and each one belongs to one of Peirce's three categories: Firstness, Secondness, and Thirdness. Since Peirce considers feelings, qualia, habit formation, and signification as basic ontological constituents of his triadic vision, he rejects the mechanical view that considers matter as something 'dead' and deterministically governed by mathematical laws. Instead, he considers matter as an inner aspect of living feeling, which is a hylozoistic view. Then, the whole developmental process of signs in history as in living beings is, in Peirce's view, through evolution. And, in turn, these were some of the founding ideas that lead Thomas Sebeok (2001) to extend semiotics to animals and all living systems in the science of biosemiotics.

Biosemiotics is, in this sense, a central conceptual component of cybersemiotics. Biosemiotics can be defined as the science of signs in living systems or, as defined by Jesper Hoffmeyer (2008: 3), as "an interdisciplinary scientific project that is based on the recognition that life is fundamentally grounded in semiotic processes". It is a growing field interested in the study of the production, action, and interpretation of signs in living systems such as sounds, objects, smells, or movements, but also it is interested in signs on a molecular scale, in an attempt to integrate the findings of biology and semiotics to form a new view of life and meaning as immanent features of the natural world. According to Brier (2013: 233) "... Life and genuine semiosis are seen as co-existing... The biosemiotic doctrine accepts non-conscious-intentional signs in humans, nonintentional signs, between animals as well as between animals and humans, and signs between organs and cells in the body and between cells in the body or nature. Thus, the biological processes between and within animals transcend the conceptual foundation of the other natural sciences". And it is from these frameworks that cybersemiotics emerges as a transdisciplinary theory of meaning, communication, cognition, and information. As I have shown, it is a metaframe, a metatheory that encompasses the research programs of information theory, first and second-order cybernetics, Luhmann's systems theory, cognitive sciences, Peircean biosemiotics, pragmatic linguistics, and language game theory, some of which I have briefly outlined. Cybersemiotics connects these research programs within the cybernetic and semiotics frameworks to provide a new inter- and transdisciplinary theory of communication, signification, cognition, and information.

As I mentioned before, cybersemiotics aims to generate a non-reductionist and transdisciplinary view of knowledge that allows the interaction of different types of knowledge in a non-ideological way, to develop a new vision of cognition, signification, information, and communication in their relationship with culture, nature and our bodies, and from here it suggests that knowledge develops into four aspects of human reality: first, it contemplates our surrounding nature described by the physical and chemical natural sciences; second, it also considers our corporality described by the life sciences

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such as biology and medicine; third, it includes our inner world of subjective experience described by phenomenologically based investigations and; finally, it considers our social world described by the social sciences (Brier, 2013: 220). Now, to create a bridge among the physiochemical, the biological, the psychological, and the social, Brier proposes some particular concepts such as 'Intrasemiotics' to refer to the process of interpenetration between biological and psychological autopoiesis; 'Phenosemiosis' to conceptualize the non-conceptualized psychological processes; 'Thought semiotics' to refer to the conceptualized self-aware psychological process generated when the silent psyche and the symbolic language system of socio-communication interpenetrate; 'Signification sphere' to conceptualize the world of meaningful semiotic relations for living systems (a concept closely related to Uexküll's *umwelt*), and the like.

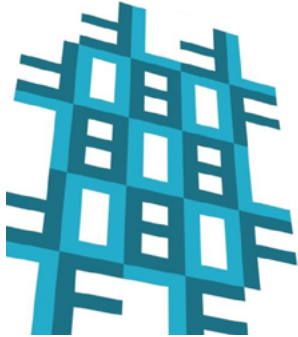
To sum up, quoting Brier (2013: 222), "Cybersemiotics proposes a new transdisciplinary framework integrating Peirce's triadic semiotics with a cybernetic view of information on the basis of an ontology of emptiness. It is an attempt to give a transdisciplinary solution to C.P. Snow's two-culture problem. The proposed framework offers an integrative multi- and transdisciplinary approach, which uses meaning as the overarching principle for grasping the complex area of cybernetic information science for nature and machines AND the semiotics of all living systems' cognition, communication, and culture. Cybersemiotics is an integrated transdisciplinary philosophy of science allowing us to perform our multidisciplinary research, since it is concerned not only with cybernetics and Peircean semiotics, but also with informational, biological, psychological and social sciences".

Finally, it is important to mention that the cybersemiotic research program led Brier to found the international journal *Cybernetics and Human Knowing* (<https://chkjournal.com/>) some decades ago, a leading journal devoted to new understandings of the self-organizing processes of information and signification in living and artificial systems as well as human knowing, that have arisen through second-order cybernetics and autopoiesis, and their relation to and relevance for other interdisciplinary approaches, such as C. S. Peirce's semiotics and biosemiotics. The journal has been a very relevant academic space to discuss and socialize many of the discussions that have taken place on cybersemiotics and the various theories it integrates, while allowing an international academic community to debate on these and many other contemporary issues. More than a complete theory, cybersemiotics is an ongoing research project on which some scholars around the world have been working for several decades now (Vidales and Brier, 2022), and that is the reason why it still has many questions to address in the future.

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