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Carlos Vidales
Søren Brier *Editors*

Introduction to Cybersemiotics: A Transdisciplinary Perspective

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Introduction: Cybersemiotics, Biosemiotics, General Semiotics

One of the most promising aspects of Charles Sanders Peirce's triadic and pragmaticist semiotics is its potential as a transdisciplinary platform bridging the sciences and humanities. For example, the evolving paradigm in biosemiotics involves observing living systems within a cognitive-communicative framework that encompasses both mechanical models of living systems derived from classical biological disciplines and models of meaning, and interpretation and signification derived from the social sciences and humanities. If we look at discussions of what it means to be scientific within the biosemiotic community, we find that most are grounded in models developed as early as Uexküll's functional-circle perception model (1926). Uexküll's bio-constructivist *Umweltlehre* is based on the hypothesis of animal qualia, a semiotic distinction, and on feedback and self-organization, which are common in fields like cybernetics and systems science. Uexküll can be viewed as a precursor of biosemiotics. His model defines the concept of marks as a series of signs that create a circular system; this kind of self-organized system is what Maturana and Varela would classify as autonomous. Indeed, Maturana and Varela's related concept of autopoiesis is often used in biosemiotics because of its similarity to the work of Uexküll.

Integrating systems and semiotics is difficult since neither field embraces the phenomenological basis for experiential consciousness or the hermeneutical basis of dialogical meaning. However, the conceptual and metaphysical foundation of Peircean semiotics seems broad enough to include not only phenomenology and hermeneutics but also systems and cybernetics. Countless researchers have worked on parts of this problem: Danesi and Sebeok's (2000) book on modeling, Hoffmeyer's (2008, 1996) and Favareau's (2010) work on biosemiotics, Sebeok's (2001) proposal of global semiotics, and Merrell's (1996) work on semiosis and life processes, among many others. However, Brier's (2008) book on cybersemiotics best exemplifies the need for a transdisciplinary point of view, since he attempts to integrate Peirce's and Luhmann's theories by looking at Peirce's semiotic process philosophy from a self-organizing cybernetics and systems framework. This collection critiques and evaluates the benefits, limitations, and alternatives of cybersemiotics as a transdisciplinary theory of cognition, signification, information, communication, and knowledge production.

In his book *Cybersemiotics: Why information is not enough!* (2008) Søren Brier examines the research built on systems, cybernetics, and information sciences. He concludes that their metaphysical notions lead to a vague functionalism and lack clarity on first-person experience, the qualia of perception and emotions, and the problem of free will. Thus, they fail to explain the meaning-making process as a general condition for living organisms, much less the emergence of meaning in the human domain. The problem of building an explanation that accounts for signification in both cybernetics and information theory is what led Brier to integrate semiotics into the theoretical framework of cybernetics and information theory. The 18 chapters included in this book address the following topics: the development of semiotics, cybernetics, biosemiotics, and cybersemiotics in its relation to meaning-making processes, cognition, knowledge production, information, signification, and communication.

In the first chapter, Marcel Danesi explains how cybersemiotics emerged in the so-called Information Age, a time when information carried value regardless of the meanings it conveyed or the individualistic interpretations it produced. Danesi says that the cybersemiotic agenda is characterized by the search for the biological, psychic, and social roots of human meaning-making detached from information-processing; he also views the dialogue between the information-processing paradigm and the semiotic paradigm as central to the construction of cybersemiotics as a transdisciplinary theoretical framework.

Søren Brier talks about pursuing a transdisciplinary view of science beyond mechanicism and dualism, both essential to systems theory and cybernetics even though they originated in the natural and technical sciences and, which therefore, have severe problems integrating qualitative sciences like phenomenology, hermeneutics, and semiotics. To reach full transdisciplinarity, Brier proposes combining cybernetics, systemics, and semiotics. Cybersemiotics would include theories of experiential embodied consciousness and meaningful communication from qualitative sciences, turning theories into models that are not confined to an algorithmic or a reductionist-physicalist view such as those developed in the pan-informational paradigm, thus avoiding a slip into a constructivist relativism.

The path that connects cybernetics and semiotics with cybersemiotics is the subject of the book's next chapter. Carlos Vidales reflects on the phenomenon of communication and explores the ways each framework has defined it. He then talks about communication as a transdisciplinary concept in cybersemiotics. In mechanicism, communication is defined as the process of sending and receiving information, a condition that can function as a general principle to define the limits and nature of communication phenomenon. However, the mechanistic view is frequently criticized for not considering consciousness, volition, or meaning-making processes. On the other hand, from the humanistic view, communication is trapped in the cognitive and social domain of the human being, ignoring its physical, chemical, and biological condition, relegating it to the status of a pre-requisite for the emergence of signification in the human social domain. These paradigms are not opposed but complementary and can be used to explain communication from the biological, cognitive, and social dimensions. Exploring communication as a transdisciplinary concept can help build a theoretical bridge between cybernetics, semiotics, and cybersemiotics.

Cybersemiotics applies Peirce's phenomenology, semiotics, and evolutionary philosophy to integrate biology, ethology, autopoiesis theory, embodied cognition, and the theories of evolution and emergence. It is necessary to explain the epistemological roots of such integration. This is done in the fourth chapter, where Winfried Nöth describes the four theoretical pillars of cybersemiotics: systems theory, communication theory, information theory, and the semiotic philosophy of Charles Sanders Peirce—four traditions that establish cybersemiotics as a transdisciplinary field of research. In contrast, according to Basarab Nicolescu, semiotics, social sciences, second-order cybernetics, and systems science are attempts at transdisciplinarity, although they tend to ignore some of its basic notions such as the included middle and the Hidden Third, and lack the crucial connection between Subject and Object. Consequently, what Nicolescu argues for in the fifth chapter is the idea that the transdisciplinary approach—given its unique way of combining ontology, logic, and epistemology—can enrich these fields. Nicolescu compares the continuous interconnectedness of transdisciplinary reality with Peirce's synechism and explains why the metaphysics of transdisciplinarity is crucial to the development of second-order cybernetics.

Having presented the general theoretical frameworks of cybernetics, semiotics, biosemiotics, and cybersemiotics in the first five chapters of the text, the rest of the book explores the relationship these frameworks have with four main topics: knowledge production processes, information, communication, and evolution. In his chapter, Paul Cobley explores the processes of knowing. Emphasizing knowledge as an *engineering problem*, he addresses a syntactic-structural aspect in cognition, thought, and communication, but leads to a decreasing interest in the cultural-societal and historical dimensions of meaning, human cognition, and communication. This would diminish the importance of social sciences, humanities, and art research in meaning construction processes. For Cobley, cybersemiotics proposes a defined transdisciplinary approach to this problem—a marriage between evolutionary perspectives on cognition and biology and the self-referring autopoietic observership derived from semiotics and second-order cybernetics. Cobley's chapter introduces a cybersemiotic perspective on the ability of the arts and other knowing practices to suggest pathways for developing Practice as Research (PaR) and practice-led research, and reviews related literature.

Michael Kleineberg also examines knowledge production processes. According to Kleineberg, there has been an increased interest in the context-dependent nature of human knowledge during the last two decades as is evidenced by the increase in Knowledge Organization research. The point of contextualism is that knowledge is not neutral nor objective, it is interlaced with the process of knowledge production and the prior state of the knower. Thus, Kleinberg considers knowledge, in its ontological (WHAT), epistemological (WHO), and methodological (HOW) dimensions, as the first step towards a systematic organization of epistemic contexts. Based on a combined ontology and epistemology, Kleineberg argues that a phenomena-based approach to Knowledge Organization requires revising the phenomenon's concept as a relation between the known object, the what, and the knowing subject, who applies specific methods, the how—a proposal that also considers cybersemiotics.

In contrast, Richard Lanigan not only finds the semio-cybernetic integration possible, he insists it has already been accomplished in communicology, but that the current conceptions of semiotics and cybernetics are often misunderstood by casual readers who assume information is synonymous with communication and that the axioms of mathematics are identical to those of logic. He also states that the evidence debated is a combination of reductionist ecology ideas about the environment: differentiation of human beings (apperceptive organic life), animals (perceptive organic life), and machines (inorganic and constructed mechanisms). Lanigan explores this communicological view that demands background skills in logic and linguistics to determine the metatheoretical criteria (found in the human science of communicology) to choose evidence among humans, animals, and machines.

Berna Valle joins the discussion of the epistemological implications of integrating semiotics, cybernetics, and cybersemiotics in Chap. 9. According to Valle, semiotics and cybersemiotics are thinking models that converge in systemics, limiting the type of semiotic systems that can be studied from the Systems Research approach, such as open systems and their transduction processes or semiosis. Also—based on the philosophical framework of cybersemiotics—Claudia Jacques develops, in the next chapter, an aesthetic analysis to explore the cultural and perceptual changes leading to and resulting from interactive hybrid environments. Jacques proposes an ontological and methodological reconceptualization of elements and relationships involved in the environments produced by Human-Computer Interaction (HCI). Her reconceptualization is carefully developed from cybersemiotics and its critique of the information processing paradigm.

The first question that arises when discussing information is: "What is information?" Liquian Zhou reviews two prevailing theories in information studies, concluding that what is keeping them from success is their premises. Consequently, Zhou turns to Peirce's theory of information as it brings new light to information studies. Peirce's theory understands information as communication of form and meaning within an interpretation process that includes both a hermeneutical and a phenomenological perspective on its transdisciplinary framework. Zhou concludes that cybersemiotics expands the transdisciplinary framework by drawing on general systems theory, second-order cybernetics, and autopoiesis theory as they are integrated into Niklas Luhmann's social system theory.

On the other hand, Sara Cannizzaro attempts to integrate ideas initially developed in the sciences into established theories in humanities by proposing to first substitute the multimodal notion of motivation for a less anthropomorphic notion of context, broadly conceived as cybersemiotic *constraints*. She argues that the original mathematical idea of the *modeling system*, developed in semiotics by Lotman and Sebeok and resonant with Brier's cybersemiotics, is appropriate for cultural analysis. According to Cannizzaro, reconfiguring discourse into a modeling system enriches Critical Discourse Analysis (CDA), including the multimodal type, based on its pragmaticist, qualia-rich, and phylogenetic stand. Alina Therese Lettner further develops this position in the following chapter where she sets the initial coordinates of a cybersemiotic philology of Buddhist knowledge forms. She explores the non-anthropocentric dimensions and the process-philosophical potential of both Buddhism and Peircean semiotics.

Just as Cobley and Kleineberg did in their chapters, Julio Horta starts a philosophical discussion on the epistemological conditions of observation from a cybersemiotic/transdisciplinary perspective on knowing. She critiques the phenomenology of observation from the pragmatic view developed by N. R. Hanson and Richard Rorty. Moreover, Horta explains the nature of the process of observation and the observable fact and, ultimately, defends the cybersemiotic phenomenology of observation, recognizing the pragmatic conditions of knowledge from a transcendental semiotic perspective. David M. Boje also addresses this integrative nature of cybersemiotics in his chapter. He tries to establish a relationship between cybersemiotics and his theory of storytelling, noting that few storytelling references in previous cybersemiotic publications have treated storytelling as language games with semantic content. From his point of view, storytelling is mainly socio-material, biological, and cybersemiotic, and not merely linguistic or cognitive.

However, since cybersemiotics integrates von Foerster's second-order cybernetics, Wiener's cybernetics, Maturana and Varela's autopoiesis theory, and Luhmann's communicative and systemic theory with Peirce's semiotics and Sebeok's biosemiotics, it establishes a new understanding of information, cognition, signification, and communication. This is Vivian Romeu's starting point in Chap. 16, where she develops a conceptual model to understand and study communicative phenomenon—understanding communication as a phenomenon of life, so that it can be conceptualized as an expressive behavior that results in an expressive act within the framework of the theory of evolution, making said expression a viable unit of primary observation of communication.

In the next chapter, Ole Nedergaard Thomsen addresses this communicative phenomenon but from a somewhat different perspective—the natural history of linguistic communication in cybersemiotics. Focusing his attention on the natural history of linguistic communication within the framework of cybersemiotics, Thomsen proposes what he calls Cybersemiotics Discourse Pragmatics. Here he describes the origins of evolution as an incremental process from language readiness to full-blown verbal communication (a sort of natural ladder) where the uppermost level integrates a full-body, multimodal, linguistic communication that embeds the preceding levels of communication. Consequently, Thomsen conceives communication as evolved from pre-communicative cognition and proposes the term *Total Human Evolutionary Cognition and Communication*. For Thomsen, a linguistic communicator is a biological agent (organism), (socio-) psychological (inter-) actant (individual), and a sociological actor (person).

We hope that the chapters in this book encourage the reader to participate in a broader discussion about the alternatives to, potential, limitations, and critiques of cybersemiotics as a transdisciplinary theory of cognition, communication, signification, and information. In 2010, in his paper "Cybersemiotics: An Evolutionary World View Going Beyond Entropy and Information into the Question of Meaning," Søren Brier states that after 30 years of working with cybernetics and systems, and the concepts of information and emergent evolution, his main critique of this pan-information view of knowledge does not manage to integrate a phenomenological first-person and intersubjective consciousness approach into a transdisciplinary theory of goal-directed systems. This text represents a step toward that goal. Our provisional answer to the problem of creating an internally and externally consistent transdisciplinary theory of information, cognition, communication, and interpretation lies in cybersemiotics. We invite the reader to explore and discuss its possibilities and limitations in contemporary science and knowledge production.

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Frederiksberg, Denmark — Søren Brier

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David M. Boje started working part-time at Aalborg's Business College in 2019. He became Professor Emeritus at New Mexico State University in January 2019. David has accepted to be a member of the Editorial Board of *The Systemic Change Journal*, which is an ongoing conversation about ways of governing the Anthropocene, and is helping to set up a Sustainability Storytelling Lab at the European School of Governance (EUSG) where Louis Klein is Dean. David convenes the annual "Quantum Storytelling Conference" each December in Las Cruces New Mexico with Emeritus Professor Grace Ann Rosile (https://davidboje.com/quantum).

Søren Brier MA, PhD, is an Associate Professor in the Department of Management, Society and Communication at the Copenhagen Business School. He is an interdisciplinary researcher who has moved from an MA in biology (ecology and behavioral sciences) over a gold medal thesis in psychology (philosophy of ethology) both Copenhagen U. through a PhD in philosophy of information sciences (Roskilde U.) after 10 year teaching at the Royal School of Library and Information science to a Habilitat in Cybersemiotics combining the natural, life, social and technical sciences with the humanities though an integration of a Peircean biosemiotic and Luhmann's autopoietic system science into a transdisciplinary framework (Copenhagen Business School). Cybersemiotics is now described in several international encyclopedias, dictionaries, and handbooks in linguistics, semiotics, information science, cybernetics, and system science. He founded an interdisciplinary journal in the area called *Cybernetics & Human Knowing* in 1992 and has been its Editor-in-Chief ever since.

Berna Valle Canales studied at Mexico's National Polytechnic Institute in the PhD program in Systems Engineering. She has focused on the spectrum of consciousness' formalization via complex science methods. At present, her research work is focused on semiotic models into decision control by means of signs alongside those of other researchers in anthropology, systems engineering, and cybersemiotics.

Sara Cannizzaro is Research Fellow at the University of Warwick. Previously she was Postdoctoral Research Assistant at Middlesex University. Sara has taught Media and Communications and Digital Media courses at the University of Lincoln, Middlesex University, London Metropolitan University, and the University of West London. Her interests are in biosemiotics, Peircean semiotics, systems theory, digital media, and the sociology of the Internet of Things. Sara's publications include *Internet Memes as Internet Signs: A biosemiotic study of digital culture* (Sign Systems Studies, 2016) and *The Devil is Not in the Detail: Representational Absence and Stereotyping in the 'Trojan Horse' News Story* (Race, Ethnicity and Education, 2018).

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Winfried Nöth was Professor of Linguistics and Semiotics and Director of the Interdisciplinary Center for Cultural Studies at the University of Kassel until 2009, Visiting Professor at the University of Wisconsin (1985–86) and Humboldt University Berlin (2014–15), and has been Professor of Cognitive Semiotics at the Catholic University of São Paulo (PUC) since 2010. He is an Honorary Member of the International Association for Visual Semiotics and the International Institute for Edusemiotics. His research is on topics of general and applied semiotics, cognitive semiotics, and Charles S. Peirce. Among his book publications are *Handbook of Semiotics* (1990, in German 2000), *Mediale Selbstreferenz* (2008, with N. Bishara and B. Neitzel) and *Semiotic Theory of Learning* (2018, with A. Stables, A. Olteanu, E. Pikkarainen and S. Pesce). Professor Nöth has edited *Origins of Semiosis* (1994), *Semiotics of the Media* (1997), and *Crisis of Representation* (2003), among others. Together with Lucia Santaella, he is the author of *Imagem: Comunicação, semiótica e mídia* (202), *Comunicação e semiótica* (2004), *Estratégias semióticas da publicidade* (2010), and *Introdução à semiótica* (2017).

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Chapter 1
Cybersemiotics in the Information Age

Marcel Danesi

Abstract Søren Brier's approach to the study of semiosis in the current Information Age fits in perfectly with the view of Marshall McLuhan that technology brings about paradigm shifts in human consciousness. McLuhan saw the information-electronic age as inducing a return to a tribal-like form of consciousness, brought about by electronic media that unite people from across the globe as if they were in a village, hence his term "Electronic Global Village." The semiotic phenomena that result from a merger of technologies and human sign-making processes are, as Brier has so cogently and persuasively shown, best studied systematically—hence his establishment of cybersemiotics, as a blend of cybernetics and biosemiotics. Brier has carved out a powerful analytical framework for tackling the information-versus-interpretation problem that has emerged in the Global Village. This chapter takes a look at cybersemiotics from the standpoint of McLuhanian communication notions, focusing on Brier's search for the biological, psychic, and social roots of human meaning-making, as distinct from mere information-processing.

Keywords Information · Cybersemiotics technology · Mass communications · Sign-creation · Biosemiotics · Media · Brier · McLuhan

1.1 Introduction

The term "Global Village" was coined in the 1960s by the Canadian communication theorist Marshall McLuhan (1962, 1964). It was intended to describe an emerging world in which mass communications technologies were starting to make it possible for people around the globe to be in contact with each other routinely, producing a form of "global consciousness" or, as Peter Russell (1983) called it at the threshold

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of the Internet era, a "global brain." For McLuhan, it was the second great paradigm shift in human consciousness. The first one came about after the invention of alphabets around 1000 BCE, which initiated a radical break from oral cultures. With the advent of mechanical print technology in the late 1400s, making the written word available broadly and cheaply, human consciousness became more logocentric and more "individualistic," shaped by the linear structure of print and the fact that people read by themselves. He called this the "Print Age"—an age that was behind radical social revolutions, from Protestantism and the Enlightenment to political movements favoring nationhood. Before his death in 1981, McLuhan saw the end of this Age and a return to a tribal-like form of consciousness, brought about by electronic media that united people from across the globe as if they were in a village. This has come to be called the "Information Age." It is an age where information in itself has value, independent of the meanings it may harbor or the individualistic interpretations it may engender. As in tribal oral cultures, any meaning that the information contains is extracted communally, via the global brain. Information itself has become the language of the Global Village—a language that requires little or no cognitive effort to process and, thus, a language that does not distinguish between truth and falsehood, as is becoming ever more evident in global affairs. And, by extension, it is a cybernetic language spoken by humans and machines alike.

Perhaps like never before in its history, semiotics has a critical role to play in this cybernetic age that does not distinguish, or care to distinguish, between human and artificial intelligence. Aware of this potential for semiotics, in 2008, Danish semiotician Søren Brier (2008) put forth a mode of inquiry that aimed to study the cybernetic universe that has emerged in the Information Age. As a blend cybernetics and biosemiotics—hence his term *cybersemiotics*—Brier gave semioticians, cognitive scientists, and information theorists a powerful new theoretical tool for tackling the information-versus-interpretation problem in the Global Village. Cybernetics was conceived by mathematician Norbert Wiener, who coined the term in 1948 in his book *Cybernetics, or Control and Communication in the Animal and Machine*. The same word was actually used in 1834 by the physicist André-Marie Ampère to denote the study of government in his classification system of human knowledge. Ampère, for his part, had probably taken it from Plato's *The Laws*, where it was also used to indicate the governance of people. The term applies to systems in which feedback and error-correction signals control the operation of the systems. Biosemiotics traces its origins to the biology of Jakob von Uexküll (1909) who tackled the information-versus-interpretation dilemma in a biosemiotic way. Essentially, he argued that each organism is designed by nature to process only the information that it needs from the environment in order to model its life advantageously. However, in humans, the information is not only used for biological modeling but is interpreted psychologically and emotionally, producing knowledge that goes far beyond the information itself. The cybersemiotic agenda is shaped by an interesting and fruitful search for the biological, psychic, and social roots of human meaning-making, as distinct from information-processing.

The question becomes why all this is so. It is one of the greatest conundrums of philosophy and semiotics. We could conceivably live without the Pythagorean theorem, extracted from information about right-angled triangles. It tells us what we know intuitively—that a diagonal distance is shorter than taking an L-shaped path to a given point. And perhaps this is why it emerged—it suggests that we seek efficiency and a minimization of effort in how to do things and how to classify the world. But in so doing we "squeeze out" of our economical symbolizations other ideas and hidden truths. To put it another way, the practical activity of measuring triangles contained too much information, a lot of which was superfluous. The theorem refines the information, throwing out from it that which is irrelevant. The ability to abstract theories and models from the world of information involves the optimal ability to throw away irrelevant information about the world in favor of new information that emerges at a higher level of analysis.

1.2 Information

Information is essentially data that each organism or machine is designed to take in and process selectively. In human life, information is literally meaningless, unless it is connected to interpretation, so that it can be utilized for some purpose. In effect, information is useless without a semiotic code for interpreting and using it. It is, as its etymology suggests—from Latin *information* "a sketch, an outline"—nothing more than encoded form. Deriving content from this form requires knowledge of how it can be represented (semiotized) and how it can be used. Not only, but the relation between the representation of information and the information itself is so intrinsic that it is often impossible to differentiate between the two. As an example of this interconnection consider an anecdotal illustration. Suppose that a scientist reared and trained at MIT in the United States sees a physical event that she has never seen before. Curious about what it is, she takes out a notebook and writes down her observations in English. At the instant that the American scientist observes the event, another scientist, reared and trained in the Philippines and speaking the indigenous Tagalog language, also sees the *same* event. He similarly takes out a notebook and writes down his observations in Tagalog. Now, to what extent will the contents of the observations, as written in the two notebooks, coincide? The answer of course is that the two sets of observations will not be identical. The reason for this discrepancy is not, clearly, due to the nature of the event, but rather to the fact that the observers were different, psychologically and culturally. Their interpretants (as Charles Peirce would have called their notes) varied as a result. The true nature of the event is indeterminable, although it can be investigated further, paradoxically, on the basis of the notes taken by the two scientists.

Despite the obvious relation between interpretation (representation) and information, very little has been done to show the explicit connection between these two domains in semiotics proper—a gap that both biosemiotics and cybersemiotics are attempting to fill. As mentioned, given the Information Age in which we live, it is becoming increasingly more difficult to distinguish between the two. It is much easier to theorize about information, which can be pinned down scientifically fairly easily through appropriate mathematics; it is much harder to develop models of interpretation because of variation, subjectivity, and the forces of history. Indeed, the traditional information sciences have focused on information itself, developing models for measuring it and for developing methods for storing or retrieving any fact or datum. From this, the concept of *information content* has emerged, defined mathematically as the amount of information in a message, represented as I, measured as an inverse function of its probability. The highest value of $I = 1$ is assigned to the message that is the least probable. On the other hand, if a message is expected with 100% certainty, its information content is $I = 0$. For example, if a coin is tossed, its information content is $I = 0$, because we already know its result 100% of the time—i.e., we know that it will have a 100% probability of ending up as *either heads or tails*. There is no other possible outcome. So, the information carried by a coin toss is nil. However, the two separate outcomes *heads and tails* are equally probable.

In order to relate information content to probability, American engineer Claude Shannon (1948, 1951, with Weaver 1949), argued that information of any kind could be described in terms of binary choices between equally probable alternatives. To this end, he devised a simple formula, $\mathrm{I} = \log_2(1/\mathrm{p})$, in which p is the probability of a message being transmitted. Log_2 of a given number is the exponent that must be assigned to the number 2 in order to obtain the given number: e.g., $\log_2$ of $8 = 3$, because $2^3 = 8$; $\log_2$ of $16 = 4$, because $2^4 = 16$; and so on. Using Shannon's formula to calculate the information content of the outcome of a *single coin toss* will, as expected, yield the value of 0, because $2^0 = 1$. Shannon used binary digits, 0 and 1, to carry out his calculations because the mechanical communications systems he was concerned with worked in binary ways—*open* vs. *closed* or *on* vs. *off* circuits. So, if *heads* is represented by 0 and *tails* by 1, the outcome of a coin flip can be represented as either 0 or 1. For instance, if a coin is tossed three times in a row, the eight equally possible outcomes that could ensue can be represented with binary digits as follows: 000 (= three heads), 001 (= two heads in a row, a tail), 010 (= a head, a tail, a head), 011 (= a head, two tails), 100 (= a tail, two heads), 101 (= a tail, a head, a tail), 110 (= two tails in a row, a head) 111 (= three tails).

The objective of information science is that of investigating systems for the generation, collection, organization, storage, retrieval, and dissemination of information. The field today brings together ideas and techniques from the social sciences, computer science, cybernetics, linguistics, management, neuroscience, and systems theory. With the transfer of massive databases to computers, information science has become a vast enterprise, merging often with Artificial Intelligence (AI), to develop models of both natural and artificial intelligence. Work on developing programs that enable a computer to understand written or spoken language (natural intelligence), for instance, has shown that whereas the logic of language structure is easily programmable, the problem of meaning and variability and interpretability is problematic for machines to compute (Danesi 2016). Nevertheless, some AI researchers believe that parallel processing—interlinked and concurrent computer operations—is leading to the development of true AI, which will become indistinguishable from natural intelligence. By integrating silicon neurons with various circuits that emulate nerve-cell membranes it is believed that artificial systems will operate at the speed of neurons and become indistinguishable from human brains. But this line of research ignores the fact, rather stubbornly, that natural intelligence emerges from bodily (protoplasmic) sensations, not simulated ones. One cannot take the mind out of the body; if one does then it would be a strange form of consciousness indeed.

In his book, *Mental Models* (1983), Johnson-Laird gives us a good overall taxonomy for talking about the notion of consciousness, which is worth revisiting here since it is particularly relevant today. According to Johnson-Laird, there are three basic interpretive schemata with which to view this notion:

1. "Cartesian machines" which do not use symbols and lack awareness of themselves;
2. "Craikian machines" (after Craik 1943) which construct models of reality, but lack self-awareness;
3. self-reflective machines that construct models of reality and are aware of their ability to construct such models.

Programs designed to simulate human intelligence are Cartesian machines in Johnson-Laird's sense, whereas animals and human infants are probably Craikian machines. But only human infants have the capacity to develop self-reflective consciousness, which is autopoietic, that is, one that is capable of self-generation and self-maintenance.

Another relevant view of consciousness is the one put forward by Karl Popper (1976; Popper and Eccles 1977). Popper classifies the world of the mind into three domains. "World 1" is the domain of physical objects and states, including human brains which can affect physical objects and processes by means of neuronal synapses transmitting messages along nerve paths that cause muscles to contract or limbs to move. It is also the world of "things." World 1 can be inhabited both by human-built Cartesian machines and by Craikian machines. "World 2" is the whole domain of subjective experiences. This is the level at which the concept of Self emerges, as the mind allows humans to differentiate themselves from the beings, objects, and events of the outside world. It is at this level that we perceive, think, plan, remember, dream, and imagine. "World 3" is the domain of knowledge in the objective sense, containing the externalized artifacts of the human mind. It is, in other words, the totally human-made world of culture. Consciousness emerges and resurfaces each time that the mind "descends" into World 2 to access its particular meaning-making mode of understanding. The act of making meaning is an act of consciousness. The mind cannot possibly descend into World 1. It can think about it, but it will never "know" it. There is evidence that animals have a form of consciousness, and an experiential domain similar to that of humans. This is the ability to know a sensation and to react to it in purposeful ways. The ethological evidence shows that animals can indeed react factually and purposefully to stimuli. The problem is trying to determine to what extent this form of consciousness becomes imaginative and inventive, transforming felt experience into a reflective type. As von Uexküll (1909) cogently argued at the turn of the twentieth century, it is unlikely that we will ever be able to "know" how animals "know," given our different anatomical and neurological systems. Moreover, it is highly unlikely that we will ever be able to penetrate the workings of our own biological systems to discover how they form the substrate of consciousness. The search to find some evolutionary, or genetic, World 1 basis to consciousness using World 3 structures such as scientific theorizing, therefore, will invariably turn out to be a difficult, if not impossible, enterprise.

A disembodied view of how humans encode and use information is essentially a useless one. So cybersemiotics aims, instead, to investigate how information relates to the sensory, emotional, and intellectual structures that undergird both the production and interpretation of signs and the extraction of personal, social, and imaginary meanings from them. It is, in other words, a study of self-reflective machines, and how these are different from Cartesian and Craikian machines. It is a means of connecting Popper's three worlds through a paradigm of semiosis. The information that a piece of music contains cannot be reduced to a mere probability event, which is part of World 1. Indeed, most of human information processing is immeasurable. So, the study of information as a human system requires much more than a Shannon-type framework. It must involve Worlds 2 and 3.

Of particular relevance to the study of information is the research in biosemiotics, which has shown how remarkably rich and varied animal communication systems are in handling specific kinds of information. Biosemiotics aims to investigate such systems, seeking to understand how animals are endowed by their nature with the capacity to use specific types of signals and signs for survival (*zoosemiosis*), and thus how human semiosis (*anthroposemiosis*) is both linked to, and different from, animal semiosis. As the late Thomas A. Sebeok (for example, 2001), a primary figure in this movement, emphasized, the objective of biosemiotics is to distill common elements of semiosis from its manifestations across species, integrating them into a taxonomy of notions, principles, and procedures for understanding this phenomenon.

As mentioned, biosemiotics takes its impetus from the work of von Uexküll (1909), the Estonian biologist who provided empirical evidence at the start of the twentieth century to show that an organism does not perceive an object in itself, but according to its own particular kind of innate modeling system. For von Uexküll every organism has different inward and outward "lives." The key to understanding this duality is in the anatomical structure of the organism itself. Animals with widely divergent anatomies do not share common modeling systems (perceptions, symptoms, etc.) equally. An organism does not perceive an object in itself, but according to its own particular kind of *Bauplan*—the preexistent mental modeling system that allows it to interpret the world in a biologically-set way. For von Uexküll, each system is grounded in the organism's body, which routinely converts the external world of experience into an internal one of representation in terms of the particular features of the Bauplan with which it is endowed. Current biosemiotics has incorporated von Uexküll's basic conceptualization into a flourishing new field of empirically-based semiotic research that continues to hold much in store for the study of information and its relation to human interpretation (see, for example, Lotman 1990; Sebeok and Danesi 2000; Posner et al. 1997–2004; Barbieri 2006; Favareau 2010; Cobley 2016).

1.3 Cybersemiotics

Biosemiotics focuses on biological organisms and their information modeling systems; it does not enlarge its purview to encompass mechanical systems, such as computers and networks such as the Internet. The expansion of this paradigm to encompass such systems has been made possible with the advent of cybersemiotics, which integrates factors that shape and constitute biology, culture, history, technology, and other systems in the study of information as an interpretive system (within the human species). It is a truly interdisciplinary science, fusing not only elements of biosemiotics and cybernetics, but also of cognitive linguistics, anthropology, and historiography.

The cybernetic component of cybersemiotics requires some commentary. Cybernetics is the science of regulation and control in animals (including humans), organizations, and machines, viewed as self-governing entities consisting of parts and their organization into wholes. It was conceived, as mentioned, by mathematician Norbert Wiener, who then popularized the social implications of cybernetics, drawing analogies between machines and human institutions in his best-selling 1950 book, *The Human Use of Human Beings: Cybernetics and Society*. Cybernetics views information processing in all self-contained complex systems (biological and mechanical) as analogous. It is not interested in the material features of such systems, but in how the ways in which they organize data. Because of the increasing sophistication of computers and the efforts to make them behave in humanlike ways, cybernetics today is closely allied with AI and robotics, drawing heavily on ideas developed in information theory. As used in communication studies, the term applies primarily to systems in which the feedback and error-correction signals control the operation of the systems. Such signals (or signal systems) are called servomechanisms. Servomechanisms were first used in military and marine navigation equipment. Today they are used in automatic machine tools, satellite-tracking antennas, celestial-tracking systems, automatic navigation systems, and antiaircraft control systems. The primary task in the cybernetic study of communication is to understand the guidance and control servomechanisms that govern the operation of social interaction and then to devise better ways of harnessing and intervening in them.

Cybernetics encompasses a taxonomy of notions, principles, and procedures for understanding the phenomenon of information in its structural and organizational features. This seems paradoxical, but information bears either organization within it, or the potential for organization, via the system (animal or mechanical) that carries it. At first, cybernetics developed its concepts from the information models devised by Shannon, which essentially depict information transfer as a unidirectional process dependent on probability factors, that is, on the degree to which a message is to be expected or not in a given situation. It is called the "bull's-eye model" because a sender of information is defined as someone or something aiming a message at a receiver of the information as if he, she, or it were in a bull's-eye target range. Shannon also introduced several key terms into the general study of communication: channel, noise, redundancy, and feedback.

What is clearly missing from cybernetics and Shannon-type information science is the semiotic focus on meaning and interpretation—both elusive features of human semiosis. Cybersemiotics entered the scene to complete the cybernetic agenda by integrating it with this basic principle of semiotics, thus extending the semiotic paradigm to cover the study of semiosis in humans, animals, and machines, putting the spotlight, however, on the uniqueness of human semiosis. Cybersemiotics has come forward to show that human sign systems have physical structures similar to those of humans and machines that are so constituted as to serve specific psychological and social functions; but they differ in their meaning-making modalities. Moreover, animal, and especially, human systems are autopoietic, that is, self-organizing in a creative, not deterministic fashion. The crux of the cybersemiotic approach thus inheres in looking more closely at the relation between information and interpretation, as Charles Morris (1938, 1946) had cogently suggested already in the 1930s and 1940s.

The ultimate goal of semiotics proper is the study meaning as it manifests itself in all spheres of human life, from small-scale structures (words, symbols, etc.) to large-scale ones (the Aristotelian final causes of things). To do so, it requires a broadening of its epistemology to encompass how signs encode raw information across systems (biological and mechanical) and how the systems select elements from the information and make use of them. The cybersemiotic agenda aims to do exactly this, and it comes at an appropriate time, given that we live in the Information Age where data itself has salience, irrespective of how it is interpreted or used. Although constituted as an interdisciplinary science, semiotics has hardly ever been adopted, or incorporated methodologically, by the information sciences in a genuine integrative fashion. Parallels are often drawn between the disciplines, but true theoretical interaction has seldom occurred, outside of sporadic attempts by individual researchers working within semiotics and information science. In the cybersemiotic paradigm the integration is both implicit and explicit, since it subsumes two main concepts: (1) semiosis occurs across all information systems (organic and mechanical) in ways that are manifestly similar, yet different in the minutiae of how the information is understood (insentiently or sentiently); and (2) human semiosis also involves a level of consciousness wherein unique meaning structures emerge and reproduce and expand on their own (autopoiesis).

Cybernetics thus asks fundamental questions about semiosis such as the following one: Do words emerge spontaneously as part of the human organism's reaction to the world, as does any reaction to a given stimulus in instinctive behavior, or are they interpretants? At a primary level, which Brier calls a first-order level, it would seem that, indeed, words and linguistic structures are products of instinctual activity, as both Uexküll (1909) and Karl Bühler (1934) argued early in the previous century. It corresponds to Popper's World 1 level and Johnson-Laird's Cartesian machine level. At this level, a continuity between humans, animals, and machines is observable—the level that was studied by Wiener formally, in discussing the many striking similarities in the functioning of human beings, animals, and machines. Essentially, all three can be characterized as displaying orderly operation and stability. One of the most important shared characteristics is feedback, or the circling back of information to a regulating device or organic system. For instance, when body temperature is too high or too low, the brain acts to correct the temperature. A household thermostat uses a similar type of feedback mechanism when it corrects the operation of a furnace to maintain a set temperature.

Aware of the far-reaching implications of his proposal, Wiener discussed both the pros and cons of making analogies between animals, machines and humans in 1950. Brier (2008) has thus re-designated Wiener's approach to the level of World 1 or first-order cybernetics, a form of investigation of structural patterns that reveal how the physical (organic) systems themselves adjust themselves to change. Such comparative study would explain why mathematics, a human invention, is the basic language that runs machines (computers). Machines and humans thus "speak to each other" through this particular Cartesian language. Because of the increasing sophistication of computers and the efforts to make them behave in humanlike ways, this type of cybernetics today is closely allied with AI and robotics, as mentioned.

However, human information systems extend far beyond this level of operation, rising to a second order, as Brier argues, where the content of the forms determines their functions. In second-order cybersemiotics, studying the first-order servomechanisms in themselves is seen as only a point-of-departure; it is in examining how they acquire meanings that the true regulation and use of information for knowledge-making—discovery, creativity, etc.—emerges in the human species. This whole line of analysis, as Brier has described throughout his substantive work in the field (Brier 1993, 1995, 1996, 1998, 1999, 2003, 2008) begs two important questions, when it comes to human semiosis. First, as Brier himself points out, it is insufficient to study information transfers solely as probabilistic signals. It is in the linkages made between words, meanings, and other interpretive structures that the human brain somehow is capable of extracting a unique form of conscious understanding. The process is not logical or purely probabilistic; it is inferential (or to use Peirce's [1931–1958] well-known term, abductive). As it turns out, therefore, language does indeed allow us to understand the world—but on our own terms. Real machines, on the other hand, are programmed to understand information practically; they cannot interpret it because, if they could, they would develop structures that become interpretants. In effect, interpretation starts at the Craikian (World 2) level, but it is not fully conscious yet. From this second order semiosis consciousness eventually emerges to provide self-reflective interpretation (World 3). There are, of course, dangers in making claims of this type, especially at the lower levels. By comparing semiotic structures with biological and artificial ones we might be engaging in anthropomorphic speculation. For example, in 1974 Marcel Florkin suggested that the concepts of signifier and signified were equivalent to genotype and phenotype respectively. Barbieri (1985, 2003) correctly pointed out a little later that a cell has triarchic structure consisting of genotype, phenotype and ribotype (the ribotype is the ribonucleoprotein system). So Florkin's analogy did not really hold.

As Brier insists, it is absolutely necessary to distinguish between information-as-entropy and information-as-meaning. Entropy is a measure of the amount of disorder or randomness in a system. Because there are many more random manners of arranging a group of things than there are organized ways, disorder is much more probable. For instance, shuffling a deck of cards is likely to lead to a jumbled distribution of cards, not an ordered sequence. By extension, entropy can be viewed as a measure of the randomness or uncertainty in information. In order for that information to become something "ordered" or "patterned" it needs to be assigned a "meaning" through interpretation. And this entails a code, a system of contact, and various other components, as Jakobson (1960), among others, have argued. For information to be more than entropy, it must be organized into something recognizable and useable (words, symbols, gestures, etc.). At a secondary (higher-order) level, the meanings invested in these primary models evolve through social and psychological semiosis, not through biology. It is, in fact, this level of conscious manipulation of information that cybersemiotics aims to study. As von Uexküll (1909) certainly knew, the transformation of information into signification inheres in understanding how the *Innenwelt* (inner world) of an organism is well adapted to interpret the *Umwelt* (the outer world it inhabits) in a specific way and thus to generate species-specific models of it so as to combat entropy. It is the interaction between raw information and its modeling that produces what we vaguely called "meaning" in human semiosis.

It has been the practice, before the biosemiotic movement, for semioticians to study, by and large, small-scale experiences of meaning within cultural domains, leaving it up to biologists to study the organic basis of communication and philosophers to study the large-scale experiences of meaning. But these should not be treated as separate practices. In human cognition, the sense of the particular reflects the sense of the general and vice versa. It is easier and much more practicable to study the particular, of course. And this is where semiotics has been thriving. As in physics, it is possible to develop special semiotic theories of the world, but rather intractable to develop general ones. Cybersemiotics seeks to develop a basis for investigating the latter. As Lotman (1990) claimed, studying human systems is equivalent to studying how they model reality in the particular. However, Lotman saw an intrinsic interconnection between the particular and universal forms of meaning-making, which emerge in the semiosphere. The latter is a state of consciousness that, like the biosphere, allows humans to adapt to, and regulate, their cognitive experiences. Lotman thus implicitly argued that the need to understand who we are, and why we feel the way that we do, is part of a larger quest for understanding of which we are an unwitting part. Eastern philosophies are attuned to this quest, modeling it in various symbolic and ritualistic ways; western philosophies have often shied away from it, preferring instead to focus on the dichotomy between the body and the mind, the biosphere and the semiosphere.

As Sebeok (1994) argued, the focus of true semiotics should be the study of the modeling capacities of the brain, which he characterized as a "semiotic organ." The operation of this organ can be seen conspicuously during infancy and childhood. When an infant comes into contact with a new object, its instinctive reaction is to explore it with the senses, that is, to handle it, taste it, smell it, listen to any sounds it makes, and visually observe its features. This exploratory phase of knowing the object constitutes a sensory modeling stage. The resulting internal models allow the infant to recognize the same objects subsequently without having, each time, to examine them over again *tabula rasa* with his or her sensory system (although the infant often will reexamine its physical qualities for various other reasons). Now, as the infant grows, it starts to engage more and more in modeling behavior that replaces this sensory phase; i.e. it starts pointing to the object and/or imitating the sounds it makes, rather than just handling it, tasting it, etc. These imitations and indications are the child's first attempts at modeling the information it has stored previously in sensory ways. Thereafter, the child's repertoire of modeling activities increases dramatically, as it learns more and more how to refer to the world through the brain's semiotic organ. These stages in childhood development are universal.

The foregoing discussion cannot ignore Chomsky's (1986, 2000, 2002; see also Anderson and Lightfoot 2002) concept of a language organ, since it seems to be suspiciously analogous to it (although it is not). From birth, we have a sense of how language works and how its bits and pieces are combined to form complex structures (such as sentences). And this, he suggested, was evidence that we are born with a unique faculty for language, which he at first called a "Language Acquisition Device" and later called an "organ," that allows us to acquire the language to which we are exposed in context effortlessly. Language is an innate capacity. No one needs to teach it to us; we acquire it by simply listening to samples of it in childhood, letting the brain put them together into the specific grammar on which the samples are based. It is as much an imprint as is our reflex system. Specifically, the organ contains a Universal Grammar (UG), which would explain the blueprint on which all language grammars are built, and thus explicate why children learn to speak so naturally. The rule-making principles of the UG are available to all children, hence the universality and rapidity of language acquisition—when the child learns one fact about a language, the child can easily infer other facts without having to learn them one by one. Differences in language grammars are thus explainable as choices of rule types, or "parameters," from the UG. He then claims that this language is present in the genes. It has been found that if a gene, called FOXP2, goes wrong a specific language impairment seems to be passed on involving word inflections and complex syntax. The gene seems, therefore, to be connected with language. But as Burling (2005) points out, connecting a faculty to a genetic source is fraught with problems:

> FOXP2 should not be considered a language gene, however. Several thousand other genes are believed to contribute to building the human brain, and a large portion of these could contribute, in one way or another, to our ability to use language. Any one of these might interfere with language if it were to mutate in a destructive way. Nor is the influence of FOXP2 confined to language or even the brain, for it is known to play a role in the embryological development of lung, heart, and intestinal issues (pp. 148–149).

There are several problems with UG theory that need not be discussed here. One is that it accounts for the development of language as a rule-making system in the child, ignoring a much more fundamental developmental force in early infancy—the ability of the child to fill conceptual gaps with words and phrases in an unexpected creative way. Bu the main one is that Chomsky claims that the language organ is, to put it colloquially, where all the action is. What about laughter, music, drawing and other semiosic abilities? Do these have separate organs or are they derivatives of language? Clearly, Chomsky's language organ is a convenient metaphor for supporting a rule based theory of language, rather than a veritable theory of mind. On the other hand, Sebeok's semiotic organ encompasses all abilities, verbal and nonverbal, as inherent in the human brain. They are hardly innate or hardwired—they develop through an interaction between the Umwelt and the Innenwelt. So the brain is a semiotic organ, which controls language, music, humor, and all other human faculties in tandem. It is, in effect, an autopoietic organ.

The term *autopoiesis* (Greek "self" and "creation") designates a system capable of reproducing and sustaining itself. It was introduced by Chilean biologists Humberto Maturana and Francisco Varela in 1972 to characterize the self-maintaining chemistry of cellular structures (Maturana and Varela 1973). Brier himself has written in-depth analyses of how autopoiesis characterizes the handling of information on the part of humans (and some other animals). Based in part on the key ideas put forward by the linguist Deacon in 1997 that symbols change through a form of creative adaptation, Brier argues that the lack of autopoiesis in machines is because machines, which belong to first-order cybernetics, are therefore *allopoietic*; that is, they are controlled by someone or something else. Autopoiesis is controlled by a semiotic organ—the higher the order of the organ's abilities, the more creative it is. In the case of humans, therefore, autopoiesis seems to know no bounds.

1.4 The Internet Era

The cybersemiotic approach to information is a powerful one, since it divides semiosis into orders that range from mechanical activity to creative activity. In the Internet era, it is important to remember this fundamental aspect of semiosis, given that it often gets lost in the quagmire of the mediasphere. When the Internet came into wide use, it was heralded as bringing about a liberation from conformity and a channel for expressing one's opinions freely. But this view has proven to be specious. Living in a social media universe, we may indeed feel that it is the only option available to us. The triumph of social media lies in their promise to allow human needs to be expressed individualistically, yet connect them communally—hence the paradox. Moreover, as social media communities are themselves connected to the larger pathways of a global connected intelligence network (the Internet), a new form of consciousness has emerged, that can be perhaps be called a third-order cybersemiotic system.

As mentioned, the term “global brain” was coined before the Internet era by Peter Russell, anticipating the effects of the Global Village on human consciousness. The global brain concept has, since then, produced a whole series of new theories about humanity that could only crystallize in the Information Age. One of these is *post-humanism*, used broadly to refer to an era in which humans no longer dominate the world but instead have merged with their machines and with animals to create a new world order that pits humans not at the center of the universe but as equal partners with other intelligences (artificial and animal). A leader of this movement is Donna Haraway (1989, 1991), whose ideas about the impact of technology on our perception of the body have become widely quoted in media, culture, and communication studies. She is also well known for her work on “cyborg theory,” or the view that machines are merging more and more with humans, replacing many functions of the human body and mind. But scholars like Haraway are ignoring the paradox of technology. As McLuhan argued, we always tend to retrieve the past in the present, and thus human progress is not linear, but cyclical. The fact that the foregoing discussion has plausibility, indicates that we are all shaped by contrasting forces at work—individualism versus globalism. This describes, in my view, how semiotic systems are evolving. In the Information Age, there is a third-order semiosis that stresses connectivity and communal cognition that often reduces meaning to a first order level. Indeed, the cybersemiotics of information is an antidote to this tendency.

The work of Derrick de Kerckhove is also highly relevant here. He is the one who introduced the term “connected intelligence” at the threshold of the Web 2.0 revolution (de Kerckhove 1997, 2015). This notion is now a common one, being renamed vicariously as “distributed cognition” or “networked intelligence.” It suggests that we are more involved in the extroverted form of intelligence (global brain), as it is distributed through the electronic mediasphere, than in individual acts of intelligence, even if we sometimes pay tribute to them as such. The interests of the group are more important than the fame of the individual in the mediasphere; and those that are considered to be important essentially are considered to be experts, meaning that virtually anyone, not just the professionally-sanctioned experts, can become famous in the mediasphere.

For de Kerckhove, the Global Village will reach (and today it can be said that it “has reached”) a critical mass of connected intelligence, which means that the sum total of the ideas of the global brain will be vastly more important than those of any individual’s intelligence could ever hope to be. He speculates that there is a strong possibility that we are undergoing one of the greatest evolutionary leaps in the history of our species. The architecture of this connected intelligence resembles that of a huge brain whose cells and synapses are encoded in software and hardware that facilitate the free assemblage and parting of minds in collaboration for any purpose. Because of this, individual brains in the connectivity are able to “see more, hear more and feel more,” as the composer Karlheinz Stockhausen put it (as cited by de Kerckhove 2015).

It is in this “networked cyber-system” that cybersemiotics can play its most important role—deconstructing and analyzing its features in terms of first order, second order (and possibly third order) semiosis and the inherent desire of the human semiotic organ to insert itself in autopoietic ways within the network. As the late Umberto Eco (1978) cogently argued a while back, the findings of semiotics can and should lead to a modification of the actual state of the objective world. For this to happen in a real way, however, semioticians must expand the purview of their science to encompass humans, animals, and machines as they communicate both uniquely and interactively in an age where information has become a premium, with or without interpretive systems. That is the goal of cybersemiotics. As we communicate, we leave traces of what we have thought and done, and thus of whom we think we are. It is an example of autopoiesis in action. Much like the body enters into a bio-communicative system with food, so too our mind enters into a parallel cognitive system with words and other signs. Particular sign systems are specific instantiations of an intrinsic need to understand ourselves and to solve similar problems of consciousness and adaptation throughout the world.

The cybersemiotic approach is a specific instantiation of Gregory Bateson's (1972) goal to understand the relation between the human brain and nature, using scientific rather than convoluted philosophical theories, such as Cartesian dualism. The crux for fashioning a semiotic agenda that can change the state of the world, as Eco claimed, is to study how human meaning systems emerge to serve human needs and aspirations. The evolution of *Homo sapiens* has been shaped by forces that we will never really understand. Indeed, for no manifest genetic reason, humanity is constantly reinventing itself as it searches for a purpose to its existence. We make veritable discoveries, we explore space, and, in a sense, we go beyond semiosis, reaching for something that no word or sign can ever really capture, just record in part. Cybersemiotic analysis has, ultimately, the aim of showing how humans, in their apparent quest for large-scale meaning, have the capacity to generate their own evolutionary momentum.

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Chapter 2
Cybersemiotic Systemic and Semiotical Based Transdisciplinarity

Søren Brier

Abstract A transdisciplinary theory of cognition and communication based on the process self-organizing and autopoietic system theory of Niklas Luhmann integrated with a triadic semiotic paradigm of experience and interpretation with phenomenological and hermeneutical aspects of C.S. Peirce, goes beyond info-computationalism in its integrating of phenomenological and hermeneutical aspects of Peircean semiotic logic with a cybernetic and autopoietic systemic emergentist process view. This makes the emergence of mind and transdisciplinary view of sciences possible.

Keywords Cybersemiotics · Transdisciplinarity · Cybernetics · Mind · Autopoiesis · Peirce · Luhmann · Self-organization · Communication · Semiotics · Phenomenology

2.1 Introduction

The pursuit of a transdisciplinary evolutionary view of the sciences going beyond mechanicism and dualism has always been essential to systems theory and cybernetics, even though they have their origin in the natural and technical sciences. Therefore – like the logic positivist and their attempt of constructing a unity of science – they have severe problems of integrating qualitative sciences like

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phenomenology and hermeneutics (Daube-Schackat 1996; Feil and Olteanu 2018) as well as semiotics in their attempts to become truly transdisciplinary. It is the unsolved problem of a theory of mind, which includes qualia (Kim 1998) that is a vital aspect of the problem. Furthermore even if that is solved, then there is still the problem if a science of experiential mind and meaningful communication beyond the quantitative and logical view of mechanistic science is possible at all (Kim 1989, 1995, 2005; Brier 2015a). von Bertalanffy (1969) as well as Wiener (1948, 1950) wanted to go beyond mechanicism. They both saw that the mechanical materialistic form of ontology that lies behind classical physics describes the cosmos as consisting of absolute abstract laws. Mechanistic science also denies the existence of experiential subjective consciousness and free will as having any causal influence on behavior and cognitive processes. That is paradoxical as experience and meaning based on natural language are prerequisite for any science, no matter how much it escapes into mathematics (Bohr 1949; Kafatos and Kato 2017). The problem is that there is no widely accepted definition of embodied social meaning in contrast to – Shannon or Wiener information. That makes the finding of formal semantic theory of information as difficult as defining an objective theory of information going beyond computer technology that does not include an embodied producer and receiver. It is my hypothesis that what we need is to enlarge our philosophical foundation with a realist semiotic process theory that can support a transdisciplinary scientific search for truth and a logic that encompasses embodied meaning.

2.2 How to Formulate the Problem

In order to be able to work with qualitative subjectivity and meaning production, we often see mechanicism being part of a dualism combining a mind independent world and a mental world. This ontology has pretty much been our common sense view in the West (Klawonn 2009) since the start of the Enlightening period, when we strived to make the subjective more rational. However, concepts like "meaning," "truth," "intentionality," and "knowledge" still do not have a rigorous explanation in traditional logic. They are part of another paradigm, the qualitative phenomenological and hermeneutical one as long as we are in a dualistic ontology or a pure materialism. Yet, there is an intuitive sense in which information is related to semantic content and meaning. So it is still a challenge to make sense of this semantic component, though it is the most central for humans. This dualist mechanical view came into conflict with the spread of evolutionary cosmological ideas in physics and modern biology. This was because the mechanical model seems unable to encompass the view of evolution as a foundation process in a reality; which both physics and biology established as foundational for the scientific worldview. This role was then taken over by Thermodynamics (Prigogine and Stengers 1984).

The physical basis for this move was partially realized by Prigogine and Stengers (1984) through non-equilibrium thermodynamics and in their break with the mechanical physics as the most basic physics to the advantage of non-equilibrium thermodynamics (Prigogine 1980, 1996) and much later Smolin (2013). The latter – inspired by Peirce – was promoting the idea of emergent developing laws manifesting as the universe develops and becomes more complicated. These chances in foundation of the sciences were supporting general systems theory and cybernetics holistic and self-organizing view of a scientific description of evolution. However, there was still the problem of mind. In cybernetics, McCulloch developed the idea of the brain as a logical computer (Dupuy 2009) leading into cognitive science and from there into the info-computation view that sees the nature, the brain, society, and the human as material computational entities; the brain being the hardware and the experiential mind as a product of the software a kind of language of thought behind the natural language. Even though Bateson (1972) expanded this to his ecology of mind, cybernetics never created a full-blown phenomenological theory of the experiential mind to get out of the cybernetic information concept of form and matter.

Thus, we have various attempts at describing cognition and communication from a transdisciplinary point of view in a material world: (1) Info-mechanical processing with matter-energy and objective information as basic stuff of the world to which all cognition and communication is to be reduced. It is usually a realistic paradigm (Dodig-Crnkovic 2013; Chaitin 2006), striving to go beyond the Turing Computer. This view leaves out the conscious observer as the cause of experiences who can detect differences and make certain differences more important than others. Communication is seen as the transfer of objectively measured bits of information (further explained in Brier 2015a). (2) Constructivist approaches are developed by human beings with an experiential focus, which combines models on meaning and reality by give up realism for the sake of a dynamic relativism focusing on power and ideology instead of truth (further explained and discussed in Brier 2009). Thus, paradigms 1 and 2 are not compatible. (3) A general systems and cybernetic view with emergence theory attempting to solve this problem through a theory of systems according to which the latter are more than the sums of their parts and in it self-organizations owns the possibility of qualitative emergence (see Brier 2008a). Still, we have no knowledge of a theory of qualitative emergence from matter, energy, and information to experience. Qualitative emergence is a nice idea but it does not really have a scientific basis. (4) Luhmann's integration of autopoietic second order cybernetic, Bateson's cybernetic mind-ecology (Bateson 1972) and general systems theory (Luhmann 1995) make the individuality of systems a function of their self-limiting and self-organizing character through internal negative feedback systems. This production of closure though autopoiesis creates individuality and agency in biological, psychological, and socio-communicative systems, making objective information transfer alone impossible without any structural couplings. It is Luhmann (1989) that creates this triple autopoiesis theory. However, even structural couplings cannot count as interpretations because experiential cognition is not theoretically grounded in the theory. Qualitative interpretation and communication is simply not theoretically addressed in cybernetics and systems, be it in Bateson (1972, 1980) or Maturana and Varela (1980, 1986). There is no phenomenological and hermeneutical foundation in the theories. It is not clear why Bateson's mind (Bateson 1980) or Maturana and Varela's biological autopoiesis

(Maturana and Varela 1986) or Luhmann's (1995) triple autopoiesis (biological, psychological, and social) should have any experiential awareness aspect, as the foundation of the cybernetic theory of mind is purely functionalistic. A combination of cybernetic, systemic and semiotic understandings of the semiotics of information, cognition and communication area seems therefore crucial to the development of a systemic Cybersemiotics that can support teaching and human development, because cybernetics and systems have not develop a theory of the origin of forms of meaning and qualia.

A Peircean view of reality includes both mind and matter as existing in the form of a complex network of continuous adaptive morphological forms or triadic sign functions. For Peirce view of logic is exceptional in that he considers logic to be semiotics: "Logic is the study of the essential nature of signs. A sign is something that exists in replicas" (Peirce EP 2:310).[1] It means that Peircean semiotic produces a philosophy and scientific theory of signs meaning and materiality. A sign is an immanent dynamic producer of forms of signification manifesting in concrete signs like the letter 'e'. A sign is a type that manifest in tokens, as there are many e-replicas on the page, but only one sign (Burch 2010). Peirce saw philosophy as the most general Branch of applied mathematics and the first discipline of philosophy as phenomenology. He agreed with Husserl that the first thing a philosopher should do was to study the most general aspects of experience and from here try to extract the most general call categories (Hartshorne 1964). Peirce in his phenomenologically and mathematically grounded philosophy was searching for a different way to establish those foundational categories that were so crucial to Aristotle's, Kant's and Hegel's philosophies (Burch 2010). After much work (Esposito 1980) he ended up with three basic categories: the monad, the dyad and the triad. Peirce invented or produced a completely new list of categories as the foundation of his phenomenologically and mathematically founded semiotics of logics.

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[1] In according with tradition reference to **W, EP1 and 2, RTL, HL, NEM, MS and R** are to: Peirce, C. S. (1992). Peirce, Charles S., *Writings of Charles S. Peirce: A Chronological Edition*, Vols. 1–6 and 8, ed. (1981–2010) Peirce Edition Project, Bloomington: Indiana University Press. **[W1–W6, W8].** Peirce, Charles S., *Collected Papers*, InteLex electronic edition reproducing Vols. I–VI (ed. Charles Hartshorne and Paul Weiss, Cambridge, MA: Harvard University Press, 1931–1935), and Vols. VII–VIII (ed. Arthur W. Burks, same publisher, 1958). [CP 1–8] [**CP. Vol and paragraph**] Peirce, Charles S., Houser, N. and Kloesel, C(ed.) (1992).*The Essential Peirce: Selected Philosophical Writings, Vol. 1*, Bloomington: Indiana University Press. [**EP1**]. Peirce, Charles S., ed. Peirce Edition Project (Ed.) (1998). *The Essential Peirce: Selected Philosophical Writings*, Vol. 2 (Bloomington: Indiana University Press). **[EP2].** Peirce, Charles S., ed. (1997) Turrisi, P. A. *Pragmatism as a Principle and Method of Right Thinking, study edition of the 1903 Harvard Lectures on Pragmatism* (Albany: State University of New York Press) [**HL**].Peirce, Charles S., ed. (1992) Ketner, K. L. *Reasoning and the Logic of Things*, the Cambridge Conferences Lectures, with introduction and commentary by Ketner and Hilary Putnam (Cambridge, MA: Harvard University Press). **[RLT].** Peirce, C.S. *The New Elements of Mathematics*; [**NEM]** v indicates volume number, p page number. **MS and R**: Peirce's manuscripts unpublished in book or article form, transcriptions or facsimiles of them available on the internet identified by MS number. Most scholars use the MS numbers assigned by Richard Robin, sometimes preceded by "R" instead of "MS".

When we talk about relational logic then its foundation is (1) The non-relative or singly relative, (2) The dual, and (3) The triple or polyadic relatives. Peirce simply called them Firstness, Secondness, and Thirdness. He determined Firstness phenomenologically as the basic feeling of qualities be it different colors, sounds or tastes. Secondness is the experience of resistance be it of matter or another mind, and Thirdness is the mediation between Firstness and Secondness aspects into the habit and understanding, the basis of his hermeneutics as a non-dual transdisciplinary paradigm. Remark that he did not start in matter and energy as the basis aspect of ontology, but in (unexplained) raw experience. Here is a quote from one of the texts where Peirce shortly describes his three categories.

> … by the "mode of being" of anything can be meant only the kinds of characters which it has, or is susceptible of taking, corresponding to the three kinds of characters, there must be three categories of things: first, those which are such as they are regardless of anything else, like the living consciousness of a given kind of feeling, say of red; secondly, those which are such as they are by virtue of their relation to other things, regardless of any third things, which is the case with the existence of all bodies, whose reality consists in their acting on each other, in pairs; thirdly, those which are such as they are by virtue of bringing two others into relation, as signs of all sorts are such only so far as they bring their significance to bear upon the objects to which they are applied (EP 2.427–428; 1907).

The idea is that that the universal forms of experience must correspond to the universal forms of thinking (Hartshorne 1964). It is important to understand that in Peircean transdisciplinarity reality is not only material; it also includes possibility or ('would-bees). He is very close to Popper's propensity theory of chance (Popper 1990). They both have the view that chance is real (Gillies 2016). For Peirce the mind and social and communicative reality is as an important aspect of reality as matter and energy. Actually, Luhmann (1995) in his autopoietic system theory also sees the social as communication. Peirce's triadic reasoning and dynamic ontology (Sowa 1999, 2013; Burch 1991) and logic of relatives goes far beyond what John Archibald Wheeler (1990 and 1994) and Ford and Wheeler (1998) developed through the scientific based philosophy of "It from bit", where information in the form of bits or even qubits at the quantum level is the most fundamental level of reality (discussed in more detail in Brier 2017a, b). Ontologically, Wheeler's idea is that a quantum level existing below ordinary physical matter consists of information. Thus, information is in this philosophy ontologically more basic than matter and energy. It is the organizing aspect of the physical world. Matter is created from information (it from bit).

However, that does not explain the experiential mind either. Therefore, quantum neurophysiology has been developed and Penrose and Hameroff (2011) have worked for many years to develop a quantum model of how the brain produces consciousness. Their theory is an alternative to computational mind (Penrose 1987, 1995). Computational mind in the form of AI has not produced conscious experience in the form of qualia that seems ubiquitous for embodied living systems' way of producing or reflecting conscious awareness. Neither natural nor computational sciences have been able to explain mind from matter, even though the quantum world do seems to go far beyond our common sense world. Recently, Thomas Fuchs

(Fusch 2018) has written a much needed book, *Ecology of the Brain*: *The phenomenology and biology of the embodied mind*, which attempts to reformulate the whole problem through integrating a phenomenological grounding in a dynamic, evolutionary, and ecological view of the brain, in an attempt to break out of the mind-brain dualism with a mechanistic basis into a non-dual process view. As Peirce's point is, "No modern science is the study of the material, but of the immaterial contained in the material. Once men were contended with facts, and names, now, we always ask What is the meaning of this thing? Now the meaning of a thing is what it convey" (Peirce W 1:50).

Within Peircean semiotic ontology information is what a sign comes to carry in acts of semiosis. Semiosis becomes more fundamental than information, which does not exist prior to or apart from the sign that contains it. Information can therefore not be ascribed to objects that are not signs. To Peirce, semiosis is not only something that goes on in language, but is the transdisciplinary phenomenon that connects, nature, mind, and culture. "I define a sign as anything which is so determined by something else, called its Object, and so determines an effect upon a person, which effect I call its interpretant, that the later is thereby mediately determined by the former" (EP2, 478). A sign is an action of mediation within the modes of being and organizations of mind as matter: "The one intelligible theory of the universe is that of objective idealism, that matter is effete mind, inveterate habits becoming physical laws" (Peirce: CP 6.25). In that view, Peirce was close to Hegel's objective idealism, but even more to Schelling's philosophy, though differs from both of them in his empiricist semiotic borne fallibilist belief in that the self-corrective empirical testing carry our hypothesis in science towards greater truth (Daube-Schackat 1996). Peirce – who was one of the pioneer developer of logical algebras (Ketner 1986; Johnson-Laird 2002) – uses his triadic process philosophy to produce a general transdisciplinary triadic dynamic model of representation and signification. Here is one of his formulations:

> In every genuine Triadic Relation, the First Correlate may be regarded as determining the Third Correlate in some respect; and triadic relations may be divided according as that determination of the Third Correlate is to having some quality, or to being in some existential relation to the Second Correlate, or to being in some relation of thought to the Second for something. A Representamen is the First Correlate of a triadic relation, the Second Correlate being termed its Object, and the possible Third Correlate being termed its Interpretant, by which triadic relation the possible Interpretant is determined to be the First Correlate of the same triadic relation to the same Object, and for some possible Interpretant (Peirce, EP 2:290; 1903).

Olshewsky (1996) describes in a very short and precise way how this phenomenological, triadic semiotics constructs a bridge from perception through sign-based thinking and non-linguistic communication to language starting with the Firstness of immediate experience:

> Phenomenological, nothing exists in the immediate present, which is pure possibility. This immediate firstness, to be actualized, must interact with a second, becoming part of an existent past, and can only be made intelligible by a third to interpret it. An interpreted event presupposes continuity and generality, and thus has implication for the future. It is by virtue

> of this implicative character that a meaningful even becomes a sign (text) to an interpreter. Thus even the most rudimentary and immediate experience must be semiotically informed to be consciously perceived. There is no thought without signs, and thirdness seeps into perception at every pore. On the other hand, thirdness is ontologically constrained by the limits of secondness and firstness (Olshewsky 1996, p. 443).

From this triadic relation logic Peirce built up the dynamic process-model of the sign. Peirce's philosophy of semiosis is a realism that is not a materialism and not a systems theory (it is before systems theory), though it can integrate one. It is a process philosophy of the non-dual continuum of mind and matter. Peircean objective idealism is a synechism, as it posits a world of infinite continuity. It is also a Tychism as its ontology posits a world of continuing activity. It has these two aspects in common with modern quantum field theory (Brier 1997a, b) and, like physics, cybernetics, and systems, it has a main focus on form. Peirce wrote:

> … there are two sorts of connection which do not involve anything but Matter and Form; namely, the determination of Matter by Form, and the blind reaction of Matter with Matter.
>
> There are, however, forms of connexion of which this is not true. Such is the action of a sign in bringing its interpreter into relation with its object. Indeed, if we fully set before ourselves all that is involved in this action, we shall see that signification, meaning the action of a sign, covers all connexions of this description … the very entelechy of reality is of the nature of a sign. One can hardly glance down a printed page without seeing a number of things, or individual objects, determined like this: the. These "replicas," as I shall call them, embody one and the same word. This one word is not an individual object. No more is it a thought, if by a "thought" be meant an individual act of the mind. Not being individual, it is not Matter. Nor is it, properly speaking, Form. For instead of being what it is of itself, and remaining altogether such as it is even if not connected with matter, the sign's mode of being is, on the contrary, such that it consists in the existence of replicas destined to bring its interpreter into relation to some object. A Form is a quality or character (Peirce NEM 4:297).

In Peircean triadic semiotics, semiosis is a relational dynamics that defines the basic process of mind becoming matter as 'instantiations'. Our universe is produced by a type-token dynamism going far beyond the conceptual linguistic human socio-communicative realm into the biological as well as physical-chemical aspects of realty (Brier 2017c). For Peirce, the universe and its laws are evolving out of a "pure "Zero" or emptiness in a vision close to quantum field physics, but still different from it with is basis in phenomenology (Cahoone 2009; Brier 2014, 2017a, b). Inspired by Aristotle, Peirce calls the directional force that drive semiosis to develop into self-correcting systems for entelechy: "This Entelechy, the third element which it is requisite to acknowledge besides Matter and Form, is that which brings things together" (Peirce NEM 4:295). It is pretty close to the force of self-organization in general system theory, which you find as central in Laszlo' books (Laszlo 1995, 1996, 2004). Peirce's philosophy is not only producing an epistemology and a transdisciplinary philosophy of science but also a connection to a trans-religious spiritual philosophy (Brier 2017d).

The difficulty of getting Peircean semiotic production of meaning accepted is that it works on a triadic logical basis, where cybernetics and cognitive science share a dyadic form of logic with Saussurean semiology and its view of language as a system. But semiology lacks an empirical connection between the semiotic system and the rest of reality as it only works with signifier and signified in a system of differences with no direct referral to empirical reality (See Brier 2015b for further argumentation). However, Peirce's view of logic and semiotics is much more realistic and naturalistic in its universality than structuralist semiology. This is achieved empirically by a fallibilist use of signs, -of which only some are words – to form hypotheses and then to determine a fallible but consequential truth through a hypothetical –deductive method. Peirce added n-adic relations to Boolean algebra in 1870, introduced quantifiers in 1880, and extended the algebraic notation to both first-order and higher-order logic in 1885. Peano adopted Peirce's algebra and changed some of the symbols to create the modern notation for predicate calculus. In 1896, Peirce invented existential graphs (EGs) as a more diagrammatic notation for "the atoms and molecules of logic", with a method that addresses the semantic issues of logic in a way that can be transferred to any notation. (Sowa 2013), because Peirce considered graphs as more diagrammatic than any linear notation. But he saw that there could never be a perfect way of representing continuity and therefore he produced many variations of Existential Graphs (EG). They are a diagrammatic system of logic by means of which, we can express, and then examine and experiment with, statements and inferences. The EG-system was invented by Charles S. Peirce in 1896, and, as developed by him, and it soon became a complete and consistent treatment of elementary logic. Still, Peirce is better known in traditional logic for his logical algebras and his pioneering work in the logic of relations (Roberts 1973).

More than a century ago, Peirce argued that there are unanalyzable three-place relations, and a relationally complete logic requires not only monadic and dyadic relations, but also genuine triadic relations. A genuine triadic relation is a relation, which cannot be analyzed into combinations of relations of any smaller acidities. Genuine triadic relations are three-relata relations. It is a commonplace of contemporary logic that there are no indecomposable triadic relations. However, as one of the major pioneers of the algebra of logic, Peirce contended that, besides monadic and dyadic relations, a relationally complete logic must also have genuine triadic relations that cannot be analyzed into combinations of relations of lesser adicity to be able to model the simple relational function of A giving B to C. Furthermore, these three-forms can be combined to all higher order forms and therefore suffice for a complete logic of relations. But for Peirce, logic is not a part of a transcendental divine rationality as the old Greeks in classical time thought (Logos). He – on the contrary – views logic as rooted in the social principle and in contrast to the Turing-based info-computationalism, he *views the social principle as rooted in logic*. As a consequence of this pragmaticist process philosophy Peirce views *logic as semiotic* and as the normative science of the right way of reasoning. This view is foundational for the communicative ethics of Habermas philosophy (Habermas 1996, pp. 13–16). Peirce wrote about this relational logic:

> The letters of the alphabet will denote logical signs. Now logical terms are of three grand classes. The first embraces those whose logical form involves only the conception of quality, and which therefore represent a thing simply as "a." These discriminate objects in the most rudimentary way, which does not involve any consciousness of discrimination. They regard an object as it is in itself as such (quale); for example, as horse, tree, or man. These are absolute terms. The second class embraces terms whose logical form involves the conception of relation, and which require the addition of another term to complete the denotation. These discriminate objects with a distinct consciousness of discrimination. They regard an object as over against another, that is as relative; as father of, lover of, or servant of. These are simple relative terms. The third class embraces terms whose logical form involves the conception of bringing things into relation, and which require the addition of more than one term to complete the denotation. They discriminate not only with consciousness of discrimination, but with consciousness of its origin. They regard an object as medium or third between two others that is as conjugative; as giver of - to -, or buyer of - for - from -. These may be termed conjugative terms. The conjugative term involves the conception of third, the relative that of second or other, the absolute term simply considers an object. No fourth class of terms exists involving the conception of fourth, because when that of third is introduced, since it involves the conception of bringing objects into relation, all higher numbers are given at once, inasmuch as the conception of bringing objects into relation is independent of the number of members of the relationship (Peirce: CP 3.63).

In Peirce's contention, the triadic function develops its morphological result by connecting relations, which are encoded spatial, temporal, and modal measurements, within that transformational act (Taborsky 2006). In Peirce's view, pure mathematics is the science of necessary reasoning about hypothetical possibilities. Rephrasing Taborsky, she suggests that one can view the three Peircean modal categories as referring to the quality of information. Peirce sees Firstness as a mode of potentiality. Information in this mode is potential but not actual. Contrary to this, Secondness is defined as a mode of individual actuality. Information in this mode exists in a discrete and individual morphology – what Bateson (1972) called a difference that makes a difference. Thirdness is defined both as a mode of generality, as habits and rules and other forms of necessity. Information in this mode exists as knowledge, understood as a substratum of normative conventions. It is a non-local mode and functions within both the internal and external zones. In short potential, actual, and necessary information.

Contrary to the info-computational view as well as cybernetics and systems relying on information as a fundamental concept, Peircean semiotic view starts out from a phenomenological ground for considering meaningfully interpreted cognition and communication (Ransdell 2017), and combines this with pure qualitative mathematics. His pragmaticism (Apel 1995), functions as a theory of determining the meaning of a concept or a model. Luhmann's systems theory and Peirce's semiotics have in common that information can only exists as part of a meaningful message whose informational contents are determined by the differences in knowledge between sender and receiver/interpreter. But the concept of experiential meaning is not theoretically and philosophically represented in systems and cybernetics. On the other hand, semiotics is in need of a systems as well as cybernetic autopoiesis theory that takes into account the dynamism and self-organizing character of embodied systems' closure. Therefore, the integrated approach of Cybersemiotics is suggested as an enlargement to Peircean semiotics, which can make it able to deal with an embodied way of handling these aspects of logical reasoning (Ransdell 2017; Feil and Olteanu 2018) because reasoning, for Peirce, is purposeful continuity of inferences and he understands logic as being semiotic.

2.3 Transdisciplinary Paradigms

Cybersemiotics attempts to combine a cybernetic-systemic and a semiotic view to amend the shortcomings of the above described transdisciplinary models to include theories of experiential embodied consciousness and meaningful communication in encompassing the area of the qualitative sciences. It does so by on one hand turning them into a model that is neither mechanistic in a totalitarian way nor confined to an algorithmic or physicalistic reductionism, and one the other hand does not lapse into a constructivist relativism by giving up all scientific truth claims. I have made a graphical model to in order to make a one view possibility of the model. See Fig. 2.1 below. Cybernetics and systems sciences attempt to overcome these problems by means of their dynamic theory of emergence, according to which new qualities arise through the development of systems as in dialectical materialism or when two types of systems are integrated. From the materialism or info-computationalism that dominates the natural and technical sciences ontology today the emergence of mind is a mystery. On hand, if matter were without mind, it would probably be chaotic pure low energy, not able to find its form as matter when the habits of the universe became law-like. On the other hand, what if we accepted constructivism as a pragmatic fact as in the hypothetical deductive method? It is us who creates the theories and scientific vocabulary to make explanatory theories world, and then accept a fallibilist realism like the philosophies of science developed by Popper (1972) and Peirce, where we empirically test the theories, with only the possibility of proving them wrong. Thus, it is through meaningful and embodied semiotic and linguistic interaction with material, psychological and social reality that we create culture as a hypothesis of how the world's processes function.

I suggest that, with regard to processes of embodied cognition and communication, the knowledge we cultivate falls into in four main areas: Firstly, the outer world often called nature, where one may further distinguish between a dead and a living part. Secondly, our view of the living part takes its start from the experience of our own bodies and empathy with other embodied beings and their ability to have bodily experiences of pleasure and pain. The third area comprises meaningful aspects like experiences and imaginations such as storytelling and phantasies, which in turn lead into the fourth area of communication and culture, where many of these stories are enacted and re-negotiated in concrete social contexts. Peirce wrote about the dynamics of the interaction of form and matter in the middle of the model to bring forth the four worlds: "We see that by the action of reason and will, that is, by the action of a sign, matter becomes determined to a Form; and we infer that wherever Matter becomes determined to a Form it is through a sign. Much that happens

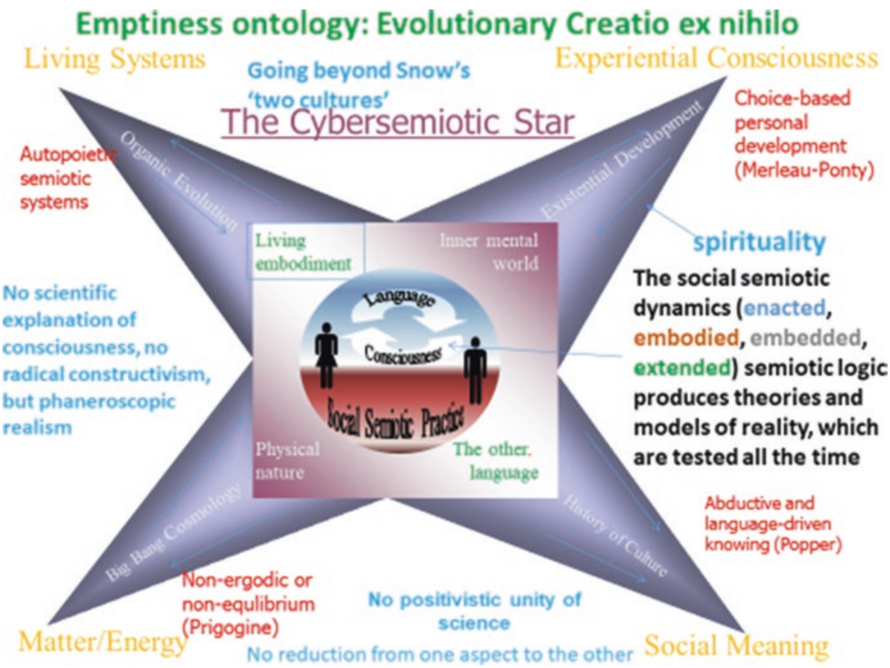

Fig. 2.1 *The cybersemiotic Star* (Brier 2008a, b, c). The red arrows going out from the center are illustrating theoretical predictions that can be tested empirically. Arrows going back towards the center illustrates test result such as falsifications going back to force changes in theories. The center is where the embodied semiotic minds interact in language born socio-cultural practices that develops a cultures take on reality including an anthropology and a spirituality. It is an ongoing learning process on many levels as Bateson (1980) has described (He defines epistemology as: "A branch of science combined with a branch of philosophy. As science, Epistemology is the study of how particular organisms or aggregates of organisms know, think and decide. As philosophy, epistemology is the study of the necessary limits and other characteristics of the processes of knowing, thinking and deciding" (Bateson 1987, p. 208))

certainly happens according to Natural Law; and what is this Law but something whose being consists in its determining Matter to Form in a certain way?" (Peirce, NEM 4:299–300).

Cybersemiotics consists in suggesting a semiotic pragmaticist theory that takes its start from those contexts of social communication from which we create science (as 'the given') in the first place. In the model abductively produced explanations flow from the center towards the points of the star out towards the surroundings, where our theories can be falsified by the way things actually are – no matter what we think about them, as Popper and Peirce each suggest in their philosophies of science. However, the model also gives up the belief in the final verification of any piece of general scientific knowledge. The model does not work with any simple reductionist explanations – be they from physics, biology, phenomenology, or social constructivism (any of the points of the star). So, there is no reduction from culture to life or matter. As Peirce wrote, "I hold that truth's independence of individual opinions is due (as far as there is any "truth") to it being the predestined result to which sufficient inquiry would ultimately lead. (CP 5.494). His semiotic process philosophy shares with Prigogine's non-equilibrium thermodynamics as well as cybernetics and systems that it is a process philosophy of irreversible time in nature, life, mind, and culture, which contrary to mechanical physics considers the so-called 'laws of nature' to be emergent 'habits of nature', which manifest as the universe develops from nothingness (Peirce 1931–1958; Brier 2015c; Prigogine 1996; Smolin 2013). Peirce's semiotic world view has Tychism in common with systems theory and cybernetics and dialectical materialism as well as dialectical idealism (Hegel) in that there is a basic random dynamic at the basic micro level as we also see it in modern quantum field theory, where all the spontaneous dynamism is in the vacuum field's virtual particles (Mandl and Shaw 1984/2002). The theory's most famous non-technical explanation is Hawking (1998).

The problem is that, as long as these different scientific paradigms do not have background philosophies that include experiential mind and meaningful communications, they cannot really connect evolution and ecology with human and cultural development, without producing a scientist explanation that is not a real philosophy. The reason is, that it is lacking an anthropological foundation that is consistent with its belief in that a group of humans – called scientists – is able to know the truth about aspects of the world. However, as Bruno Latour (1993) claims with the title: *We have never been modern*, we have never been able to separate nature and culture really, as is also obvious from Peirce's synechism or logic of continuity (Zalamea 2012). As a concrete example, we can look at the so-called ecological crisis. What we consider natural landscapes are most often cultural products of our views of nature. That of course means that the ecological crisis is a cultural crisis. It is our problem as a culture that the honeybees as well as the majority of insects and therefore the birds in nature are dying off at accelerating rates. So for Peirce, what information theory of Shannon & Wiener defines as bits, Bateson defines as differences that makes a difference, and Maturana and Varela claims has to be part of a structural coupling for an autopoietic system to put any signification on differences, Peircean biosemiotics says that when a difference is able to make a difference on a living system – as a species – then it is the definition of a sign. The difference is an object that is interpreted to have significance for the survival or pleasure of the species, or individual as part of a culture, its survive and flourishing human welfare.

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Chapter 3
From Cybernetics to Semiotics to Cybersemiotics: The Question of Communication and Meaning Processes in Living Systems

Carlos Vidales

Abstract After Thomas Sebeok's proposal of global semiotics in the 70s, an attempt to move beyond anthroposemiotics to the realm of zoosemiotics, phytosemiotics, endosemiotics, and, ultimately, to the all-encompassing realm of biosemiotics was made. Semiotics was then established as a serious candidate as the transdisciplinary base of science and humanities –particularly from the triadic and pragmaticist semiotic proposal of C. S. Peirce. However, the semiotic attempt to explain the fundamental aspects of living systems from the standpoint of meaning production and reproduction demonstrate that in order to explain the meaning-making process in living organisms a systemic, biological, cybernetic and informational approach was also needed. The integrative visions have discovered some basic similarities among these theoretical perspectives from which it has been possible to recognize complementarities among them. At the same time, it also made possible to identify variations at the very bottom of each approach, which resulted in a complex task of theoretical integration. Thus, in order to uncover these tensions and complementarities, I will focus my attention in the process of communication in an attempt to move from cybernetics to semiotics and further on to cybersemiotics considering some aspects of biosemiotics, first and second-order cybernetics, Peircean semiotics, and information theory. The goal of this chapter is to overcome the problem of defining the limits and boundaries of communication as a physical, biological, and social phenomena and its nature as an academic field by proposing communication as a transdisciplinary concept from the point of view of cybersemiotics (Vidales, Commun Soc 30:45–67, 2017b), from which it is also possible to address the process of communication, explained in what Brier (Cogn Semiotics 4:28–63, 2009) considers to be the levels of cybersemiotics, and the consequences it may have for the explanation of meaning-making processes in living systems.

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3.1 Introduction

Nowadays, communication is a word with multiple meanings implied, many of which are not only ambiguous but also contradictory. It has been associated with so many natural, physical, biological and social phenomena that its explanatory potential seems to have vanished. Common sense has adopted communication as an excellent metaphor when referring to information processes, social situations, biological conditions and even physical problems; all of them linked (in some ways), to a particular form, manifestation or expression of the communicative phenomena. Its potential to name different processes has been extended beyond the human scope to include the general forms of life, the interaction between humans, objects and ideas, and along the lines of how organisms know and interact with their surrounding world. However, this condition is not fortuitous, since its descriptive power is not grounded on any particular social or historical context, neither has it been generated by an academic theoretical conceptual field, it is rather a basic condition given that communication is fundamentally a natural phenomenon. Hence, the idea that I am interested in developing herein is that communication is not a social, biological, cognitive or physical phenomenon, but merely a process that involves a social, biological, cognitive, and physical component and that the fact that some components are highlighted in particular processes or research is a matter of scales and not of levels of organization.

Communication is a phenomenon that has been explained and defined in biology, physics, cognitive sciences, and in general, in the social sciences. However, communication seems to mean something different in each academic field. As a result, each field seems to have their own communicative phenomenon and its own theoretical explanation, and while some of those theories can be complementary, others are opposed or contradictory. This situation makes it almost impossible to work transdisciplinary or interdisciplinary in research projects or to clearly identify the limits and boundaries of the communication phenomena, the academic field of communication and, in particular, to clearly state its ontological dimension. What is communication? What does it describe in the physical, biological, chemical or social domain? What are its limits? What is its ontological nature? What is not a communicative process and why? Therefore, one possible path to overcome this situation is moving to the consideration of communication as a field or theory to the consideration of communication as a transdisciplinary concept, a proposal that aims to produce an integrated understanding of communication by combining the theoretical proposals that are complementary to each other, hoping it will allow us to move from one particular domain of reality to another and from one academic field to another.

According to the *International Encyclopedia of Systems and Cybernetics* (François 2004), transdisciplinarity implies, first, the existence of a metalevel of models and concepts, leading to an integrated understanding by every part-taker of the system under study; and second, it implies the existence of a common metalanguage based on isomorphism, which finds itself very useful to convey generalized concepts and metamodels. For Peter Checkland, what we need is not interdisciplinary teams, but transdisciplinary concepts, "concepts which serve to unify knowledge by being applicable in areas which cut across the trenches which mark traditional academic boundaries" (Checkland in François 2004, p. 632). Thus, my foremost argument is the need to build communication as a transdisciplinary concept, an idea that could help us understand how it is expressed in each domain of reality and how each one of its explanations could be complementary to a general integrative theory of communication. However, in other to do this, it is extremely important to recover previous work on this subject.

Historically, there has been several theoretical approaches that define and explain communication, its meaning-making processes, and in general, the signification phenomenon. On the one hand, it is possible to identify theoretical traditions within the areas of semiotics, hermeneutics, phenomenology, and social psychology (just to mention some), and on the other hand, we can find other traditions grounded on cybernetics, systems thinking, life sciences, and mathematics, among others. Despite the clear differences both the humanistic and mechanistic traditions have, the main problem is that in each framework communication seems to be something different either in its conceptual form or in its empirical dimension.

As I have argued in previous work (Vidales 2017a), in the mechanistic view, the idea of communication is grounded in Shannon's proposal of informational exchange between a sender and receiver (signals), a proposal that has been considered the foundation of the transmission or informational model of communication (Craig 1999). According to this view, communication has been defined as the process of sending and receiving messages or transferring information from one mind to another. On the other hand, from the humanistic point of view, communication is associated with the human process of meaning production and signification (signs) as well as with the cultural process of sign production and signification (Eco 1976; Danesi 2004, 2007; Kress 2010; Leeds-Hurwitz 1993; Jensen 1995; Bergman 2004; Vidales 2013). From this perspective, communication can be defined as a meaning-making process. Thus, we stand in front of two paradigms –among several others– (Craig 1999, 2013) that have been very influential in communication research, however, none of them has functioned as common ground for theoretical construction and empirical research (Bryant and Myron 2004) nor as criteria to define the limits or boundaries of communication as an academic field.

In the mechanistic view, communication is defined as a process of sending and receiving information, a condition that can be considered as a general principle to define the limits and nature of the communication phenomenon, however, the main critique that arise in the humanistic view is that this approach does not consider the meaning-making process, consciousness, and volition. At the same time, in the humanistic view, communication seems to be trapped in the cognitive and social domain of the human being ignoring its physical, chemical and biological conditions considering them only as pre-requisite for the emergence of communication in the human social domain. This is why the idea of communication as a transdisciplinary concept would be helpful, primarily because both paradigms are not opposed but complementary and can be useful to explain communication from the biological to the cognitive and social dimensions. Therefore, I am interested in exploring two main traditions. The first one is cybernetics; the one proposed by Norbert Wiener many years ago that has been further developed into second-order cybernetics by authors like Heinz von Foerster and Paul Watzlawick among plenty others. The second one is semiotics, and more precisely, the proposal made by Charles S. Peirce more than a century ago and that has been further developed by Morris, Sebeok and countless other authors, and which recently was expanded into the general framework of biosemiotics.

Having explored how communication can be defined and explained from the standpoint of cybernetics and semiotics, I will move towards the explanation and definition of communication arising from Søren Brier's cybersemiotics, a conceptual integration of Peirce's semiotics, second-order cybernetics, and Luhmann's triple autopoietic systems theory, as a general framework that presents itself as a transdisciplinary theory of communication, cognition, information, and signification. Ultimately, from that, I will develop a more detailed proposal of communication as a transdisciplinary concept.

3.2 Describing Communication from the Point of View of First and Second-Order Cybernetics

One of the most important books written about cybernetics, which can also be considered foundational, is the one published by the American mathematician Norbert Wiener in 1948 under the title "*Cybernetics: or control and communication in the Animal and the Machine*", a book that had a strong impact on the scientific community, from engineering, mathematics and biology to life sciences, social sciences, and humanities. Later on, in 1954, Wiener published another book titled "*The human use of human beings*" in which he precisely discussed the social implications of cybernetics. For Wiener (1954), the emergence of cybernetics must be understood as part of a process of historical change in science in general and in physics in particular. The Newtonian physics, which had ruled from the end of the seventeenth century to the end of the nineteenth, described a universe in which everything happened to be regulated by law; a compact, tightly organized universe in which the future depended upon the past. However, physics way of thinking changed significantly by the end of the nineteenth century due to the work done by Ludwig Boltzmann in Germany and Josiah Willard Gibbs in the United States, both implementing a new and radical idea: the use of statistics in physics. Even when others like Maxwell were already using statistics, Wiener considers that "what Boltzmann and Gibbs did was to introduce statistics into physics in a much more thoroughgoing way, so that the statistical approach was valid not merely for systems of enormous complexity, but even for systems as simple as the single particle in a field of force" (p. 8).

Statistics is the science of distribution, but Boltzmann and Gibbs's distribution was not interested in a large number of similar particles, but in the different positions and velocities from which a physical system might start. From the Newtonian system, the same physical laws are applicable to a great variety of systems that begin with a great variety of positions and momenta. The new application of statistics maintained a single principle, according to which a particular system may be distinguished from other systems by its total amount of energy but rejected the notion that systems with the same total of energy can be clearly distinguished and described by fixed causal laws. The functional part of physics avoids considering the uncertainty and contingency of events, and that was precisely Gibbs' merit, to be the first to develop a scientific method capable to consider these features. So, for Wiener (1954), it is Willard Gibbs whom we must attribute the first great revolution of twentieth-century physics. This revolution means that physics no longer claimed to deal with what will always happen, but with what will always happen within an overwhelming probability, and in a way, that in a probabilistic world we no longer deal with quantities and claims about a real and specific universe as a whole, on the contrary, we make questions which may find answers in a large number of similar universes. Gibbs' innovation was to consider not just one world but all the worlds in which it is possible to find answers to a limited set of questions regarding our environment, which means that the answers we may give to questions related to a set of worlds are probably found in a larger set of worlds. The measure of this probability is called entropy, and it has a tendency to increase.

Then, as entropy increases, the universe and all closed systems within tend to naturally deteriorate and to lose distinctiveness, and at the same time, systems also tend to move from a state of organization and differentiation (in which forms and distinctions exist) to a state of chaos and sameness. For Wiener (1954), in the universe conceived by Gibbs order is the least probable whilst chaos is the most probable, but while the universe as a whole tends to run down (in the case such a universe exists), "there are local enclaves whose directions seems opposed to that of the universe at large and in which there is a limited and temporary tendency for organization to increase. Life finds its home in some of these enclaves. It is with this point of view at its core that the new science of Cybernetics began its development" (p. 12). Wiener (1954), who had worked on the theory of messages since World War II, considered cybernetics to be closely related to it; he also considered a larger field broadly linked as well, which included not only the study of language but also the study of messages (as means of control of machinery and society), the development of computing machines, the study of the psychological and nervous systems, and provisionally, to a new theory of scientific method; all areas of research carried out from the standpoint of a probabilistic theory of message, a condition that can be considered Gibbs' legacy as mentioned above.

In addition, it is important to point out that from the beginning; cybernetics defined not only information but also communication processes and control. According to Wiener (1954), when someone communicates with another person, a message is imparted, and when the other person communicates back to the original sender, he or she returns a related message that is primarily accessible to him or her and not to the original source. Subsequently, when someone's action is controlled, a message is communicated to him or her, and unless it is in the imperative mood, the technique of communication does not differ from that of a message of fact which means that if the control is to be effective the original source must take cognizance of any message from he or she that indicates that the order has been understood and obeyed. This is what led Wiener (1954) to consider that society can only be understood through the study of messages and the communication facilities which belong to it, and moreover, that in the future, the development of communication processes and its facilities would make it necessary to study the messages between man and machines, between machines and man, and between machines and machines. A prediction that can be confirmed almost half-century later in which society could be understood in terms of the process of communication and messages from person to person through the mediation of machines.

For Wiener (1954), giving a message to a man or to a machine does not differ significantly, since we are aware of the order that has been sent and of the signal of compliance that has to come back, and "the fact that the signal in its intermediate stages has gone through a machine rather than through a person is irrelevant and does not in any case greatly change my relation to the signal. Thus, the theory of control in engineering, whether human or animal or mechanical, is a chapter in the theory of messages" (p. 16–17). Of course, there are some detailed differences in each case that must be considered, and that was precisely the purpose of cybernetics, to develop a general language or theory to understand and study the problem of communication and control in general, but also to produce a conceptual way to identify and classify their particular manifestations.

Wiener (1954) used the idea of the relationship between a system and its environment (in terms of information exchange and communication processes) to describe cybernetic systems. For example, in the case of human beings, a living system perceives its environment through its sense organs, and the information it receives is coordinated through its brain and nervous system until (after the proper process of storage, collation, and selection) it emerges through some organs, such as its muscles. Eventually, these emergent processes act upon the external world, which in turn, reacts on the central nervous system through its receptor organs. The information received is combined with the already accumulated stored information to influence future actions, and this is what information is about: is the content of what is exchanged by a system with the environment or the outer world as the system adjust to it and makes its adjustment felt upon it, as it also occurs with living organisms and machines broadly. This process, named as feedback by Wiener, is a concept that describes the process of control in a system (machine or a living organism) on the basis of its actual performance rather than its expected performance, in other words, "feedback is a method of controlling a system by reinserting into it the results of its past performance" (p. 61). From the above stated, it is possible to assume that information is related with the exchange between a system and its environment and that this process of exchange is what communication consists itself of. It is from this point of view that Wiener (1954) proposed his main thesis.

> It is my thesis that the physical functioning of the living individual and the operation of some of the newer operation machines are precisely parallel in their analogous attempts to control entropy through feedback. Both of them have sensory receptors as one stage in their cycle of operation: that is, in both of them there exists a special apparatus for collecting information from the outer world at low energy levels, and for making it available in the operation of the individual or of the machine… In both of them, their performed action on the outer world, and not merely their intended action, is reported back to the central regulatory apparatus. This complex of behavior is ignored by the average man, and in particular does not play the role that it should in our habitual analysis of society; for just as individual physical responses may be seen from this point of view, so may the organic responses of society itself. I do not mean that the sociologist is unaware of the existence and complex nature of communications in society, but until recently he has tended to overlook the extent to which they are the cement which binds its fabric together (p. 26–27).

This led Wiener (1954) to propose that information is not only related to entropy but also to negentropy, a special case of order and organization, and to consider that information is information and not matter or energy. This was also the argument in which Tom Stonier (1990) based his proposal of negentropy, the organizational power of creating systems and structures in nature. As it can be seen, cybernetics is not interested in 'things' as such, on the contrary, as W. Ross Ashby (1957) argues, it is interested in 'ways of behaving'. Even when cybernetics was associated with physics at the beginning, it does not depend on the laws of physics or on the properties of matter because its main interest is in all forms of behavior as far as they are regular, determinate, or reproducible. The main focus is in the process of feedback and not the organism or machine that produced it, nor its elements; that is why cybernetics is not interested in the individual acts a machine will produce here and now, but in all the possible behaviors it can produce and to which extent is a machine or any other system subject to determining and controlling factors in the process of producing such behaviors. As a result, according to Ashby (1957), cybernetics has two virtues. One is that it offers a single vocabulary and a single set of concepts suitable for representing the most diverse types of systems, providing a common vocabulary by which discoveries in one branch can be useful in another. For example, it is possible to find some suggestive parallelisms between a machine, the human brain, and society. The second virtue of cybernetics is that it offers a method for the scientific treatment of the system, and outstanding complexity that is too important to be ignored. For Ashby, these kinds of systems are only too common in the biological world.

As Wiener (1982) explained, cybernetics was a word form derived from the Greek κυβερνήτης (*cybernḗtēs*) referring to "steersman, governor, pilot, or rudder". Cybernetics, as defined by Wiener, is the study of control and communication in the animal and the machine and it is primarily interested in explaining purposiveness or goal-directed behavior, which is an essential characteristic of mind and life in terms of control and information from the point of view of complex and stable dynamical systems. Dynamical systems are those capable of modifying their state and those that also include a whole series of other systems and more simple elements interrelated between them and acting together. From the point of view of processes and operations, a complex dynamical system that moves from one state to another while maintaining its stability is denominated a system of control. Therefore, Cybernetics is interested in what is common within different goal-directed systems (regardless of their physical nature) such as the organization of actions towards a particular and convenient goal (usually to adapt the system to their external conditions), which are the basic functions of performance that make them, precisely, a control, driving, dynamical and complex system (Jramoi 1968). However, despite its clear success in the development of automatic controllers, computers, information, and transmission systems, just to mention some, theoretical developments of cybernetics went far beyond these early applications.

Cybernetics was later on applied in anthropology, neurophysiology, cognition, molecular biology, psychology, communication, and industrial organization, among many other fields, by authors like Warren McCulloch, Margaret Mead, Stafford Beer, Gregory Bateson, Gordon Pask, Paul Watzlawick, W. Ross Ashby, John von Neumann, Claude Shannon, Heinz von Foerster, and Arturo Rosenblueth. This last author was one of the many who participated in the series of interdisciplinary meetings held by the Josiah Macy Jr. Foundation from 1944 to 1953, meetings known today as the Macy Conferences on Cybernetics. During this period, cybernetics was also associated with the school of General Systems Theory (GST), founded around the same time by Ludwig von Bertalanffy who also considered cybernetics to be part of the GST. In other words, whereas GST studies systems at all levels, cybernetics focuses specifically on goal-directed, functional systems which have some form of control relation (Heylighen and Joslyn 2001).

However, from the beginning, Wiener (1982) suggested the possibility of identifying similarities between autonomous, living systems and machines but recognized the need for the development of a non-mechanistic view on cybernetics that emphasized autonomy, self-organization, cognition, and the role of the observer in modeling a system as the first step. Later work was not only a new step in the theoretical development of cybernetics, but a new understanding of reality, an understanding of understanding, a move from the observation of a system to the consequences observers may have upon the process of observing that system. In a nutshell, it was the birth of the cybernetics of cybernetics or second-order cybernetics. Second-order cybernetics "… began with the recognition that all our knowledge of systems is mediated by our simplified representations –or *models*- of them, which necessarily ignore those aspects of the system which are irrelevant to the purpose for which the model is constructed. Thus, the properties of the systems themselves must be distinguished from those of their models, which depend on us as their creators" (Heylighen and Joslyn 2001, p. 156).

According to von Foerster (2003), we can consider first-order cybernetics as *the cybernetics of observed systems*, and second-order cybernetics as *the cybernetics of* *observing systems*. Then, while Wiener's proposal focused on communication and control, second-order cybernetics is focused on communication and control but regarding observing systems and their influence on the very process of knowledge production, which led theory to include concepts such as self-reference, self-organization and circularity; the first one associated to a logical operation in which an operation is itself an object of study, for example, when we talk about language, when we think about thinking, or when we become aware of our own consciousness.

As Francis Heylighen and Cliff Joslyn (2001) suggests, a first-order cyberneticist will study a system as if it were a passive, objectively given "thing" that can be freely observed, manipulated, and taken apart. However, a second-order cyberneticist considers any system, such as the biological or social ones, as agents in its own right but that interact with another agent, the observer. Subsequently, both the fundamental transformation generated in the academic field by information and the transformation cybernetics generated as a general epistemology, implied the need of explaining not only the observed world but also the importance of the systems observing that world; a major step into the field of epistemology since according to Gordon Pask we go from questioning the objectivity principle to assuming that all our notions are not independent of our nature as observers, and also, that this relation is not only a general condition for all observers but a condition for all the systems being observed (Pask in Foerster 2006).

The work done by Humberto Maturana and Francisco Varela (1980) on autopoiesis, the contribution of George Spencer-Brown (1979) on algebra, and the move from systems being observed to observing systems proposed by Heinz von Foerster (2003), among other contributions, where the theoretical basis that legitimate self-references processes not only as natural phenomena but also as a form of inquiry. The essential circularity of self-references was then considered the cornerstone of the world as we experience it –in its biological, organizational, cognitive and social notions. And it also goes directly to the heart of communication about communication, as Klaus Krippendorff (1984) suggested, and from which he proposed an epistemological foundation for a cybernetic perspective on communication that I consider essential in proposing communication as a transdisciplinary concept. Allow me to briefly recoup Krippendorff's proposal.

According to Krippendorff (1984), cybernetics has been concerned with transformation, processes, and change, not with material things, a condition that explains why it has always emphasized the importance of variety and alternatives. The first one (variety) shown to be a requisite for adaptation, intelligent behavior, evolution, and at the same time it is recognized as a logical necessity of organization on all levels. From this point of view, it is possible to assume that these three forms, circularity, process, and variety are common to all cybernetic inquiry. Observation was added later, but it turned out to be one of the most important ones for second-order cybernetics. But what are the consequences of taking these forms as an epistemological basis for defining communication processes and communication itself? To Krippendorff (2009), communication theory by the 80s was primarily concerned on providing an ontological definition of what communication is, a position that had at least three consequences: (a) considering nature of reality or what exists as independent of observation, (b) considering observation as a one-way process of communication from disinterested objects of nature to intelligent and interested observers, and (c) "these ontological commitments force scientist into roles as detached observers intellectually superior to their objects of descriptive interest" (p. 38). Then, an alternative approach is an epistemological one.

> Cybernetic epistemology does not concern itself with knowledge of what exists external to us, ontology, but focuses on processes by which we come to know, on "knowing", denying "knowledge" to be a thing, and considering "the known" as constructed by the knower. Thus, cybernetics acknowledge observers and observed as interacting and communication between them flowing both ways. This allows the properties of observers to enter their domain of observation which renders the enlightenment standards of objectivity unachievable… The choice of one paradigm over another is not subject to empirical proof, for each carries its own criteria of acceptability. I propose here a basic epistemological unity for inquiries in general and communication in particular (p. 38–39).

As it can be seen, there is a clear difference between defining communication ontologically and explaining how such phenomena emerge in this world. The second approach is an epistemological perspective in which communication as an object of study becomes built into the process of inquiry about communication, producing a kind of vicious cycle. It is from this perspective that Krippendorff (1984) proposed that observation entails a unity of two processes mediated or embodied in an observer and his environment: (a) the drawing of distinctions (or distinctions), and (b) the formulation of relations (or relations). However, the idea of the separation or distinction between the observer and its environment must be understood merely as a prop to develop the idea, after which the distinction will no longer be necessary and should be abandoned in favor of the idea of an epistemological unity –system and environment as a whole–. "Distinctions are drawn by an observer in his environment. Whether distinctions are purposeful and reflected, or involuntary and determined by cause or conventions, they divide a space into parts and thus exert some force upon the observer's domain of observation" (p. 53). Then, the drawing of distinction is arbitrary and creates, at the same time, variety in the observer's environment by creating two alternatives at least. Drawing a distinction is fundamental for the observer because without a first distinction an observer cannot obtain any information and, in consequence, is unable to say anything about his environment. "Distinctions are prerequisites of understanding" (p. 54).

Relations, on the other hand, are formulated by an observer to reconstruct that holistic property in his environment which his distinction seems to violate, therefore, relations must be put in some form (a nervous system, a computer algorithm, a descriptive system or a language) that "must be capable of operationally representing, reproducing or modeling how one part formed by the distinction differs from, is linked to, correlates with, conditions, follows, causes, etc. the other part formed by the distinction" (p. 54). From this perspective, the epistemological unity lying under as the basis of cybernetic inquiry is precisely the alternated sequence of drawing distinctions and the formulation of relations by an observer, but it is unclear which came first in a particular phenomenon or when a particular phenomenon is analyzed. Hence, observation implies relations and distinctions in a sequence of interaction, it is a dialogue among the parts of a system that alternate between assuming the role of observer and environment, correspondingly, which makes it difficult not only to establish a distinction and to identify one side as an "observer" and the other side as "the observed", but also to decide which side acquires knowledge about the other. "From this, a cybernetic epistemology would conclude that knowledge and understanding is neither objective nor subjective. It becomes manifest in the circular form of interaction" (p. 56–57).

Cybernetic epistemology is not concerned on the knowledge outside us (ontology) but on the processes by which we come to know, on knowing, on denying knowledge as a thing, and on considering the known as constructed by the knower, as it has been argued above. It is then a different vision that clearly assumes the role of observers in the processes of observation and it is also the epistemological basis from which Krippendorff (1984) develops notions of communication in three contexts: (a) communication in observed systems, (b) communication in systems involving their observers, and (c) communication in systems of production.

In the first case, communication in observed systems or first-order cybernetics, refers to observed systems approached to by an observer who sees himself as essentially outside that system, and as a consequence, the observer does not include himself in the description of the system nor does he see himself as observed by that system. From this perspective, the definition of communication is clearly an ontological one, as Harold Lasswell puts it in his famous "paradigm" (who says what, to whom, through which channels, and with what effects). On the contrary, and with its emphasis on epistemology rather than ontology, Krippendorff (1984) considers that cybernetics focuses its attention on the observer's contribution to bringing phenomena into being, from which he proposes two definitions of communication. "Communication is what defies the decomposition (without loss in understanding) of a dynamic system, and, as it turns out equivalently: communication is what makes the behavior of one variable (component or part or member of a system) incomprehensible without references to the behavior of the others" (p. 58).

However, the previous definitions require that the observer draw at least three kinds of distinctions: (a) distinctions among individual parts of a system, (b) distinctions among the states these parts can take, which allow the observer to present the system as a whole and its parts as variable, and (c) distinctions in time, which allow the observer to ascertain the behavior, "and both definitions take communication to be the relation that recaptures what all three of these distinctions seem to violate. The cybernetic definitions of communication amount to a test of certain holistic properties of an observer" (Krippendorff 1984, p. 58). Since communication is considered to be a process that implies change, it is possible to assume that its fundamental transformation is behavior, and from this point of view, communication becomes embedded in one unity of the identity as follows: Behavior of the whole system is equal to the Behavior of each part viewed separately plus communication among all parts.

Therefore, there are some properties associated with the concept of communication related to observed systems that should be considered. Observed systems are informationally closed, that is to say, an observer can only consider information about what he observes or knows about the portion of the world he attends to. "All properties he is able to discern are limited by this information. Communication too can be analyzed and described only in terms of the information on hand" (Krippendorff 1984, p. 60). Traditionally, communication has been defined and analyzed based on Shannon's proposal of a linear casual conception of a process that involves an active sender and a responding receiver, however, for Krippendorff (1984), cybernetics has developed a different approach based on the representation of circular causal processes of communication and information that involve feedback in which the observer takes the side of the part to which information returns.

> By such repetition, circular processes of communication modify their own contents until the process reaches an equilibrium at which iterative modifications have ceased to be effective and if changes are then still present they are stationary and, to a significant degree, predictable. In observed systems this equilibrium is called homeostasis and the empirical fact of this convergence has earned the theory of communication explaining this phenomenon the name "convergence model"… Important is that the homeostasis actually reached by the observed system is not explainable from the properties of any of the system's parts but emerges in the process of communication, which cybernetics proposes, is thus able to explain the emergence of stable forms as self-generated or eigen-properties of systems involving a circular process of communication (Krippendorff 1984, 61).

Now, regarding communication in systems involving their observers, Krippendorff (1984) suggests that a theory of such systems allows the properties of the observer to enter the description of the system, then these kinds of systems are primarily related to social systems (group of individuals who observe each other and communicate which each other about their observations) which are also self-referential, since observers must be constructed within the very object they claim to describe, and as a consequence, explaining and formulating a theory of those objects is also changing those objects as they are being described. In short, these types of systems are "social systems" and are related with second-order cybernetics as I have described before.

Social Systems consist of at least two observers paired in such way that each provides the other's environment and they share the notion of 'communication' and the idea of 'identity' (whole equal parts plus interaction) with the observed systems, except that the parts now contain observers. In this case, the states of these observers are the distinctions drawn and the relations established by them, which can be seen as descriptions or representations but not as an external object, but as relevant history of the interaction between an observer and a portion of his world. In this context, communication becomes an exchange of descriptions among observers to an extent where the whole system is constituted by and cannot be understood without reference to these descriptions.

While a theory of observed systems is able to explain how a system converges towards homeostasis, in the case of social systems, this theory is able to explain how a system converges towards a stable description of itself and within itself. "By definition, a description is called stable when it remains unaltered despite repeated iterations or when it resists changes throughout the repetitive process of circularity"

(Krippendorff 1984, p. 66), therefore, it is possible to argue that social systems compute their own stable realty. However, for Krippendorff (1984), reality is not owned by the system it emerges from, nor it is represented in, or separated from it. Social systems constitute themselves in the process of computing their stable reality through the descriptive acts of their members, and in so, and by its concern for predicting stabilities of descriptions, the theory of communication in social systems explains the constitution of these very own systems. "In social system distinctions are drawn in the course of communication and, when they have some degree of stability, constitute that system's own boundaries" (p. 66), therefore, descriptions also define the identity of the system's components and they do so in the system's own terms.

A theory of communication in these kinds of systems is primarily concerned with how such identities evolve and what it is that the observing components of a system come to be, and where they locate themselves within the network of communication. But, such a theory also suggests "that the realities computed by each component need not be shared but must be compatible through manifest communication with the realities computed by the other components so that the reality computed by the whole may be stable" (p. 67).

Finally, in the case of communication in systems of production, the material realization and the energy this kind of systems require to maintain themselves in physical space is extremely remarkable. Hence, what we are describing is nothing but communication in systems whose material form is an integral part of its description. For Krippendorff (1984), these are systems that produce components that can interact with parts of the system already in existence, however, he also suggests that such theories of communication are nearly non-existent but can be grounded on the work of authors like the economist Kennet Boulding, the psychologist James G. Miller and primarily on the biological approach of Humberto Maturana and Francisco Varela which describe self-reproduction systems that contain essentially circular processes. For Krippendorff (1984), a way to define systems of production is to take its main processes as a starting point: all living things process information, but at the same time they also produce material entities that replace other entities that have decayed, and thereby maintaining the system in operating condition. Those material entities produced engage in interaction with other material entities and may expand the system in space and improve its processes, making the system more efficient in time, as well as in the space it occupies. As it can be seen, Krippendorff's definition of systems of production is closely related with the idea of autopoietic machines described by Maturana and Varela.[1] To sum up, according to Krippendorff (1984),

[1]According to Maturana and Varela (1980), "an autopoietic machine is a machine organized (defined as unity) as a network of processes of production (transformation and destruction) of components that produces the components which: (i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produce them; and (ii) constitute it (the machine) as a concrete unity in the space in which they (the components) exist by specifying the topological domain of its realization as such a network" (p. 78–79).

> Systems of production incorporate all kinds of communication. There are processes of communication of a linear or circular causal nature making the system or parts of it converge towards homeostasis and into subsystems of interdependent parts. There are processes of communication of descriptions making the system or parts thereof converge towards stable self-descriptions and develop local identities. But what I see to be characteristic of systems of production is that communication explains in what the production of and/or by a whole system differs from the production of and/or by its component parts. Including how the interaction of components copies, reproduces or produces itself in space. In systems of production communication is the ingredient of material organization (p. 71).

From the above stated, it is possible to argue that communication is not a thing, is not something that can be studied without considering the process of observation (distinctions/relations). In cybernetic epistemology, communication is not part of the observed system (it does not occupy any physical place) neither is an arbitrary and imagined construction without a ground, instead, communication is that observer-created relational construction which explains what makes a system defy its decomposition (without loss of understanding) into independent parts (Krippendorff 2009). We have then a cybernetic explanation of communication that allows us to understand how is that it emerges as a phenomenon and what is its relation with observers and the process of observation; but it seems that we have omitted an important process, that is the meaning-making process. What is the relationship between signification and communication? What are the relationships among drawing distinctions, the formulation of relations, and the emergence of meaning in living systems? Cybernetics seems to have a problem, just as the mechanistic view in general, when it comes to explaining the meaning-making process in living systems. And this is precisely why a semiotic vision is necessary in order to fulfill those aspects that a cybernetic epistemology cannot explain by itself when we are trying to address the nature of communication and signification in living organisms, not to say, the emergence of emotions, qualia or consciousness.

From the stand point of Søren Brier (2008), some of the research done in systems, cybernetics, and information sciences was built on metaphysical notions that have led to vague types of functionalism and that do not take a clear stand on first-person experience, the qualia of perception and emotions, and the problem of free will as I have shown with the cybernetic point of view. "Modern versions of the pan-informational paradigm often combine functionalism with non-equilibrium thermodynamics, non-linear systems dynamics, deterministic chaos theory, and fractal mathematics as descriptive tools. But again, we seldom encounter systematic reflection on how these versions differ from mechanistic views […] or on the nature of a concept of meaning and how signification arises in mind" (Brier 2008, p. 39–40). And this is why a signification theory is needed, and the reason Brier integrates the semiotic and the informational paradigms, since semiotics, as described by Peirce, is the doctrine of the essential nature and fundamental variations of possible semiosis (EP 2:413) (Peirce 1998).

The importance of the semiotic paradigm is that it is focused on the possibilities of meaningful communication in living and social systems, through the search for answers about communication and meaning production in cultural and historic dynamics, and also in the biological conditions of meaning emergence. In this sense, Peirce founded semiotics as a general logic that integrated a general theory of sign production, which in turn permitted the expansion of semiotics beyond the human scope into sign processes within all types of systems, including, living systems. Brier (2008) suggests that in the semiotic philosophy of Peirce, feelings, qualia, habit formation and signification are basic ontological constituents of reality, which means that the semiotic paradigm should be able to penetrate beyond chemistry and physics, a movement that has been developed in biosemiotics research (Hoffmeyer 2008; merrell 1996, 2013; Sebeok 1979, 2001b; Martinelli 2007). From the info-computational point of view, information, matter, and energy are the three basic elements of reality, which implies that natural and objective information had to be present before the emergence of human minds and, in this sense, information is something more important than its observer or its interpreter. "Information is viewed as an objective and universal law-determined thing that both humans and machines absorb into their minds from nature, change by thinking, and bring it to society throughout language" (Brier 2008, p. 54).

However, in order to overcome this somehow reductionist view, it is necessary to explore the human mind, the reality of first-person consciousness, and to view the intelligence and meaning of communication as real. This implies that information sciences must include what has been already developed in cognitive sciences, systems sciences, semiotics, and biosemiotics, since they do not have experiential subjects with qualia and, therefore, do not have a unified transdisciplinary paradigm. Information sciences in the subject area of living systems and humans will not be able to explain vital aspects of the cognition and communication phenomena, such as meaning and the constraints of the social context, if they do not include a theory of meaning-making processes. Then, allow me to further explore the semiotic paradigm, in order to understand how communication can be and has already been explained from this perspective. The final move will be the integration of both perspectives into the general proposal of cybersemiotics in which communication is conceptualized as a transdisciplinary concept.

3.3 Describing Communication from the Point of View of Semiotics and Biosemiotics

In his contribution to the *International Encyclopedia of Unified Sciences*, Charles Morris recognized the importance of Charles Sanders Peirce's theory of signs as a general criterion for science unification. In his work, *Foundations of the theory of signs*, Morris argued the double relationship semiotics had with science, for it can be considered both a science and an instrument of science. According to the author (Morris 1955), semiotics was seen as a general principle for science unification, since it encompassed all fundamental principles. During this movement towards the unification of sciences, Morris believed that the notion of *sign* was the key element, since that concept was capable of expanding itself in order to encompass the humanities, social and psychological sciences, and it was also capable of distinguishing these areas of study from the biological and physical sciences. In other words, the notion of *sign* was seen as a concept that could integrate the historically separated fields of biological, physical and social sciences. According to Morris (1955),

> […] The concept of sign may prove to be of importance in the unification of the social, psychological, and humanistic sciences in so far as these are distinguished from the physical and biological sciences. And since it will be shown that signs are simply the objects studied by the biological and physical sciences related in certain complex functional processes, any such unification of the formal sciences on the one hand, and the social, psychological, and humanistic sciences on the other, would provide relevant material for the unification of these two sets of sciences with the physical and biological sciences. Semiotic may thus be of importance in a program for the unification of sciences, though the exact nature and extent of this importance is yet to be determined. But if semiotics is a science co-ordinate with the other sciences, studying things or the properties of things in their function of serving as signs, it is also the instrument of all sciences, since every science makes use of and express its results in terms of signs (p. 80).

In considering semiotics as a general principle for the unification of sciences, Morris recovered Peirce's proposal to understand semiotics (semeiotics) as a general logic, as a general epistemology capable of observing other sciences processes of knowledge production and the way they construct themselves. Later on, Thomas Sebeok, who was one of Morris' students at Chicago, took an important step forward in the development of semiotics as a general framework by taking the systematic application of semiotics beyond the social phenomena. The importance behind Sebeok's work lays upon his notion of 'global semiotics' that unified the physical, social and biological fields of signification, which was initially envisioned by Morris decades before.

For Sebeok (2001a), all human beings, or more precisely, all living entities in our planet modulate their environment by means of signs but just a small group of them will have a professional domain of this activity (Petrilli and Ponzio 2007). During his contact with Ray Birdwhistell at Chicago, who would be later recognized as the promoter of kinesthesia, Sebeok identified that the universe described under the label 'nonverbal communication' was much more profound and that if studied, it could lead us through the long trip between cellular structures and cultural structures, following a unique conceptual line, but also pointing out a basic premise about our own nature, the fact that life and semiosis converge, that are coextensive, or in other words, that "semiosis must be recognized as a pervasive fact of nature as well as of culture" (Sebeok 2001a, p. xvii).

The stated before means that semiosis is not only a human sign activity but it is something that characterizes all living systems in our planet including animal and plants. For Sebeok (2001a), at the beginning of the 70s, it was clear that it was absurd to restrict semiotic research to our species and that is why it was necessary to extend their field of reference to the whole animal kingdom, in its great diversity, a field that was later named *zoosemiotics* by Sebeok himself. In consequence, for some decades "normal" semiotics became restricted to the realm of *antroposemiosis,* while zoosemiotics, as a new research domain, extended semiotics to other biological domains, although it was also focused on the study of the Homo Sapiens as a biological unity rather than a cultural one. In addition, for Sebeok, the proposal made in 1981 by Martin Krampen about the possible existence of semiosis in plants was the starting point of a new discipline, *phytosemiotics*. Later on, in 1991 with the work of Sorin Sonea, it also became possible to recognize semiosis processes in the prokaryote realm (included all bacteria) that lead semiotics to talk about the possibility of *microsemiotics* on the bacterial level that was, in turn, the ground for the later work of Maurice Panisser and Lynn Margulis. For Sebeok, without a doubt, the most important consequence of these perspectives that observed semiotic processes at a micro level such as cells and bacteria, was discovering that our own body is an almost invisible network of semiotic processes, and this is precisely the level in which Thure von Uexküll (1992, 1997) developed a conceptual framework to identify the pertinent integration of the levels of semiotics which were labeled as *endosemiotics*.

The next step was the integration of all these semiotic phenomena into the all-encompassing field of *biosemiotics*. “Biosemiotics (bios=life & semion=sign) is a growing field that studies the production, action and interpretation of signs, such as sounds, objects, smells, movements but also signs on molecular scales 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. 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 in nature (Brier 2013, p. 233). The main point of Sebeok (2001a) is that he considered that humans and all living organisms in the planet live in what he called a *semiosphere*, a term grounded on the idea of biosphere (all of the biota and also the condition for the continuation of life) of the Russian Vladimir Vernadsky and recovered later on by Juri M. Lotman. For Sebeok, the biosphere is the parcel of Earth that comprises life-signs that includes the lithosphere (solid surface), the hydrosphere (oceans), and the atmosphere (gases); is where we live and what we are, and in the end, it is something that we share with the rest of the living organisms in the planet. Although the term semiosphere was originally used by Lotman, Sebeok considers that, in fact, Lotman’s concept was much more restrictive than Vernadski’s idea of the biosphere. And, even though Lotman (1990) affirms that there cannot be communication nor language outside the semiosphere, he fails to recognize that antroposemiosis is linked to zoosemiotics, which means that human semiosis is played out predominantly in the prelinguistic extra-verbal mode, and in consequence, the once considered a “primarily modeling system” (like in the ex-Soviet Union), in reality, turned out to be a secondary superstructure (Sebeok 2001a).

According to Sebeok (2001a), the earliest and smallest known biosphere module with semiotic potential to be considered as the “semiotic atom” is a single bacteria cell, one of the most complex living entities that display general autopoietic properties. Grounded on Sorin Sonea’s (1990) bacterial network work, Sebeok argued that bacteria can be seen as “the global organism”, since together they constituted the communication network of a single superorganism whose components are always changing, can be found dispersed across the surface of the planet, and are those who will create the environmental conditions that will favor a completely new form of life: the eukaryotes. Later on, it was Thure von Uexküll who proposed the term *endosemiosis* to refer to all processes of sign transmission inside all eukaryotic organisms and went on to identify any body as a hierarchically structured "web of semiosis", an argument from which Sebeok identifies four ascending levels of endosemiotic integration. The first level of sign processes occurring inside individual cells is –as mentioned earlier– called *microsemiosis*, the second-level related to information networks is called *cytosemiosis* (von Uexküll et al. 1993). The third level concerns the combination of cells into organs by a network of nerve cells, which is subtly intertwined by dendrites of nerve cells with a considerably slower transport system for sign vehicles, the bloodstream. Finally, Thure von Uexküll and his co-authors "shown in their important study how the neural and immunological counterworlds are tethered by sign processes to form a conjoined unitary inner world, which corresponds to a fourth endosemiotic integration level that is then transmuted into an 'experienced reality'" (Sebeok 2001a, p. 13). These levels are going to be of importance in the consideration of the levels of signification in Søren Brier's cybersemiotics.

Then, for Sebeok (2001a), it is a movement that goes from semiotics to biosemiotics and from biosemiotics to global semiotics from which he postulates his two cardinal and reciprocal axioms of semiotics: "(1) The criterial mark of all life is semiosis; and (2) Semiosis presupposes life" (p. 10). In addition, Sebeok considers that "semiosis is the processual engine which propels organisms to capture 'external reality' and thereby come to terms with the cosmos in the shape of species-specific internal modeling system" (p. 15). This means that just as living organisms evolve, so does semiosis, but life is necessary in order for semiosis to exist, and in consequence, semiosis could not exist prior to the evolution of life, a condition that can be extended into Peirce's (1955) definition of *sign* (something that stands for something to somebody, in some respect or capacity). In other words, it addresses a somebody, it creates a more developed sign inside the mind of that person, who becomes the *Interpretant* of the first signs.

The sign stands for something, its *Object*. Then we have an irreducible triadic relation among three elements, a sign, its objects, and its interpretant as the interpretation of the sign. On the other hand, for Morris (1955), semiosis is a process in which something is functioning as a sign and three main factors are involved: that which acts as a sign, that which the sign refers to, and the effect on the interpreter, in virtue of, whatever sign the thing in question is to that interpreter. Despite the clear difference between Peirce's idea of the Interpretant and Morris's idea of the interpreter, Sebeok's main argument is the fact that both definitions of sign and semiosis (among many others) imply, effectively and irreducibly, that at least one link among its elements must be a living entity, an idea from which it is possible to recoup again the fact that there could not have been semiosis prior to the evolution of life, or that life and semiosis are coextensive, as it has been argued before.

Later on, by proposing semiotics as a general epistemology for thinking and observing the biological field, semiotics moved beyond the social and philosophical dimension in order to include all forms of semiosis in nature, resulting in the separation of its objects of study in two major areas: Biosemiotics and Physiosemiotic (Deely 1990). This is what led Sebeok to consider semiotics as a particular point of view for observing the emergence of semiotic processes in biological organisms in general, and in the human being in particular (Sebeok 1979, 2001a, b), and what led Jesper Hoffmeyer to consider semiotic processes not only as a central aspect in the development of living beings, but as a central aspect in their evolution and survival (Hoffmeyer 1996, 1997). That was the foundation of biosemiotics, an interdisciplinary scientific project based on the recognition that life is fundamentally based on semiotic processes (Hoffmeyer 2008; Favareau 2010).

As we can see, semiotics has evolved from a general logic to a general criterion for the unification of sciences, and ultimately, to a point of view (Deely 1990).[2] However, there is a final step that recovers these previous visions into an interdisciplinary project focused on the integration of some of the existing methods of investigation that relate to the comprehension of communicative, cognitive and informational processes. This is the cybersemiotic proposal, a project that could be considered as one of the continuations of Peirce's proposal of semiotics as a general logic. However, before moving to the explanation of how communication can be construed as a transdisciplinary concept from the point of view of cybersemiotics, allow me to briefly sum how communication has been defined from semiotics. In his *Encyclopedic Dictionary of Semiotics, Media, and Communications*, Marcel Danesi (2000) defines communication as production and exchange of messages by means of signals, facial expressions, talk, gestures, or writing, and it is related with the art of expressing ideas, especially in speech and writing. On the other hand, in the *Encyclopedia of semiotics* (Bouissac 1998), communication is defined as something that indicates some form of transfer in a reciprocal or unidirectional mode and can be applied to both, the general and selective circulation of messages and their technological means of conveyance. However, the *Encyclopedia* also recovers one of the fundamental problems when it comes to define and distinguish communication and semiotics (or semiosis), mainly because they share almost the same object of knowledge. As stated in the *Encyclopedia* (Bouissac 1998), "Studies in communication

[2] According to John Deely (1990), a method "implements some aspect or aspects of a point of view; indeed, the systematic implementation of something suggested by a point of view is pretty much what a method is. But a point of view that can be fully implemented by a single method would be, on the whole, a very narrow viewpoint. The richer a point of view, the more diverse are the methods needed to exploit the possibilities for understanding latent within it" (p. 9). In this sense, semiotics is considered as a perspective or point of view that emerges from the explicit recognition of what every method of thought or every research method presupposes, since from the semiotic point of view, ideas are not self-representations, but "signs of what is objectively other than and superordinate to the idea in its being as a private representation" (Deely 1990, p. 10). Semiotics is based on a unique activity in nature that was primarily recognized by Peirce and later by the Biosemiotics movement, and it was called *semiosis*. This is a key idea in Deely's proposition of semiotics as a point of view, since he argues that signs are required for every method to exist as such and, by consequence, any method ceases to be semiotic if it considers signs upon which it relies as if they were merely objects.

are in some respects equivalent to semiotics. However, the different histories of the two terms have meant that there is both overlap and discrepancy between them. Communication theory can be taken to refer to alternative brands of semiotics, or semiosis can be understood as a specific set of theories of communication… For instance, communication markedly emphasizes agency and process, while semiotics usually focuses on the sign and their relations" (p. 132).

From the *Encyclopedia's* point of view, there are at least four distinct notional themes from communication theory that have significant theoretical implications in semiotics: (a) the linear models of communication grounded on Shannon's proposal of the messages exchanges and highly developed in the study of mass communication, (b) the reciprocal and participatory models of communication grounded in the Saussurean tradition and used in language-oriented research, (c) the idea of communication as process and product which is equivalent to the idea of text or message (product) and the chains of events linking the production, reception, and circulation of messages and meaning (processes), and (d) communication as material process, an argument that refers to systems that transport people and material goods from one place to another and, in modern societies, to the theorization of the interdependence of technological developments in transport systems and in the mass media (Bouissac 1998). In contemporary communication research we have, perhaps, a strong presence of the integration of both the first and fourth notional themes stated in the *Encyclopedia*.

The importance of reciprocal and participatory models of communication in semiotics is also recognized by Paul Cobley (2013) who considers the Saussurean tradition, later developed by Roland Barthes, as one of the most important and influential approaches in communication research. However, from Cobley's perspective, it is important to recognize that Saussurean semiology is not principally concerned in how signs refer to or communicate about specific, but in how regimes of communication (somewhat removed from specific objects) are sustained and perpetuated.

After Saussure, Cobley (2013) explains the code and text theories as means of communication theory from the standpoint of Umberto Eco's perspective. In the same manner, Winfried Nöth (2014) described those that have been considered the most important models of human communication, from the semiotic point of view, recognizing the importance of Saussure, Eco, Peirce, Buyssen, Prieto, Jakobson, Greimas, and Lotman's communication models. However, Nöth also recognizes a fundamental problem regarding the relationship between communication and semiosis, and mainly, between the field of communication and semiotics. From his point of view, "If semiotics is the study of sign processes (semioses) in nature and culture, it necessarily includes the study of communication since communication is undoubtedly a sign process, but is the reverse also true? Are all process of semiosis processes of communication?" (p. 97). For Nöth, semiotics has been divided into two domains: semiotics of communication and semiotics of signification, considering the later as a broader domain beyond the study of communication (since it is concerned in the study of signs of non-communicative purpose) but in the end, as Nöth

(2014) suggests, the dividing line between these two fields of semiotic research remains fuzzy.

From my point of view, the problem is the implied notion or definition we are using to describe what communication is and what communication processes produce. From the mechanistic view, communication is concerned with the information exchange, and from the humanistic point of view, it is concerned in the processes of meaning production. However, as I have argued before and I will do it in detail over the next section, communication is a process that can be identified in all domains of reality and cannot be separated from semiotic processes. In order to further develop this idea, I will focus on Peirce's communication theory, considering the work done by Charbel Niño El-Hani et al. (2009) from biosemiotics since their proposal integrates information, semiosis, and meaning into a coherent framework in which communication is also defined as part of the emergence of semiosis in semiotic systems. Please allow me to briefly explore their proposal.

Peirce defined information as a connection between form and matter, and logically, as a product of the extension and intention of a concept. From this first approach, *information can be conceived as the communication of a form from an Object to an Interpretant through signs*. This is consistent with Peirce's notion of habit since the authors suggest that information can be seen as a particular habit, subsequently, information can also be conceived as the communication of a habit embodied in the Object to the Interpretant so as to constrain, in general, the Interpretant as a sign. From this point of view, communication is more than the mere transmission of a form. "To put it in more detailed terms, the production of an effect of the Sign on the interpreter results from the communication of the form of the Object (as a regularity), by Sign mediation, to the Interpretant. The interpretation then becomes itself a Sign which refers to the Object in the same manner in which the original Sign refers to it […] According to this approach, 'information' can be strongly associated with the concepts of 'meaning' and 'semiosis'. Peirce spoke of Signs as 'conveyers', as a 'medium', as 'embodying meaning'. In short, the function of the Signs is to convey the form" (El-Hani et al. 2009, p. 92).

For these authors, the notion of *form* does not refer to "things" or abstract concepts, but to something that is embodied in the object as a habit, a "rule for action", a "disposition", a "real potential" or a "permanence of some relation" (EP 2:391) (Peirce 1998), all notions closely related to the very process of semiosis. Peirce defines a Sign as a medium for the communication of a form, but he sees it as a triadic relation to its Object, which defines it, and to its Interpretant, which also defines it. This argument led the authors to suggest that, if we consider both definitions of 'sign', it is possible to say that semiosis is a triadic process of communication of a *form* from the object to the Interpretant by sign mediation and, it is also possible to understand the idea of 'interpretation' "as basically meaning to subsume a given particular event under a general class of events, and, by thus subsuming it, to answer to it in a regular way, learnt by systems through evolution or developing" (El-Hani et al. 2009, p. 93).

In addition, in their study of genes, information and semiosis based on Stanly Salthe's model of a basic triadic system in biology, Charbel Niño El-Hani et al.

(2009) proposed what they have called a *multi-level approach to the emergence of semiosis in semiotic systems*, a proposal built upon Peircean semiotics, and particularly upon his theory of sign construction and triad formation. Their model addresses semiotic processes three levels at a time, according to which, in order to describe the fundamental interactions of a given entity or process in a hierarchy, we need "(i) to consider it at the level where we observe it ('focal level'); (ii) to investigate it in terms of its relation with the parts described at a lower level (usually, but not necessarily always, the next lower level)'; and (iii) to take into account entities or processes at a higher level (also usually but not always the next higher level), in which the entities or processes observed at the focal level are embedded" (p. 139). Then, it is important to mention that both the higher and lower levels have a constraining influence over the dynamics of the entities or processes at the focal level. In this sense, these constraints are precisely the key elements in the explanation of the emergence of entities or processes at the focal level. The authors also recognized that the selection of the focal, the higher and the lower levels depends on the research goals and on the epistemological and methodological approaches on which a particular research is based. From this perspective, it is possible to assume that what is considered the focal level in one research might be different from what is considered the focal level in another research, and the same can be said about the higher and the lower levels. But despite this condition, it is important to mention that a higher-level constraining focal-level semiotic process can itself include semiotic processes. Then, "at the lower, the constraining conditions amount to the 'possibilities' or 'initiating conditions' for the emergent process, while constraints at the higher level are related to the role of a selective environment played by the entities at this level, establishing the boundary conditions that coordinate or regulate the dynamics at the focal level" (p. 140).

In their model, the authors (El-Hani et al. 2009) argued that an emergent process at the focal level is explained as a product of the interaction between processes at the higher and lower levels, which is another way to say that at the focal level, possibilities or initial conditions interact with boundary conditions. Then, "processes at the focal level are embedded in a higher-level environment that places a role as important as that of the lower level and its initiating conditions. Through the temporal evolution of the system at the focal level, this environment or context selects among the states potentially engendered by the components at the lower level those that will be effectively actualized" (p. 140).

As stated before, what is selected for particular observation is what occurs at the focal level, which is not a fixed phenomenon rather it depends on the observer's interest or on their particular research goals. However, the authors consider that what we observe at the focal level are semiotic processes described as *chains of triads*. This, in turn, is what makes it possible to study the interaction between semiotic processes as potentially determinative relations between the lower level or *Micro-semiotic level*, and the higher level or *Macro-semiotic level*. In this sense, it is important to point out that, that while we can observe chains of triads at the focal level, at the macro-semiotic level we are able to observe *networks of chains of triads*. On the other hand, "the micro-semiotic level concerns the relations of determination that may take place within each triad S-O-I. The relations of determination provide the way the elements in a triad are engaged in semiosis" (p. 141).

As we can see, the authors' proposal is based on the idea of the semiosis developed by Peirce in which an Interpretant can be a Representamen of a new triad at the same time. This is a basic criterion that is used in arguing that semiosis cannot be defined through an isolated triad but requires, as a minimal condition, the establishment of some kind of relation to a general chain of triads since a triad is a final point but also a new starting point. Furthermore, what we observe as a particular triad is, in fact, a particular moment of an endless semiosis process. This is the argument the authors use for asserting that, at the micro-semiotic level, a triad [ti = (Si, Oi, Ii)] can only be defined as such in the context of a chain of triads as previously shown [T = {…, ti−1, ti, ti + 1,…}]. Then, what will emerge at the focal level is a process that results from the interaction between the micro-semiotic and macro-semiotic levels. In addition, the Micro-semiotic level involves the relations of determination within each triad, and ultimately, the Macro-semiotic level involves networks of chains of triads in which every individual chain is embedded.

At this point, it is important to recover the idea of Dynamical and Immediate Objects proposed by Peirce, since it is an important distinction in the proposal made by the authors on semiosis emergence. Hence, what Peirce argued is that every Representamen is related to the particular Object it represents, but given that it cannot Represent the whole Object (Dynamical Object) it has to select a particularity to be Represented by the sign, which is, in turn, the Immediate Object. This is why Peirce considers that "[…] we must distinguish between the Immediate Object – i.e., the Object as represented in the sign – and the Real (no, because perhaps the Object is altogether fictive, I must choose a different term; therefore), say rather the Dynamical Object, which, from the nature of things, the Sign *cannot* express, which it can only indicate and leave the interpreter to find out by collateral experience" (EP 2:248) (Peirce 1998). Then, it is possible to argue that the Immediate Object is the Object as the Sign itself represents it and whose Being is thus dependent upon the Representation of it in the Sign (CP 4:536) (Peirce 1931–1935). This distinction is very important since it is what I will use as a general principle to illustrate how theories evolve in time and how it is possible to understand their emergence, continuity, and rupture by recognizing how Representamens are Related to Dynamical and Immediate Objects and how that determines the construction of some Interpretants and not others.

El-Hani et al. (2009) use this principle to argue that at the micro-semiotic level initiating conditions are established and, in this process, it is possible to assume that every chain of triads always indicate the same Dynamical Object through a series of Immediate Objects, then, "the potentialities of indicating a Dynamical Object are constrained by the relations of determination within each triad. That is, the way O determines S relatively to I, and S determines I relatively to O, and then how I is determined by O through S lead to a number of potential ways in which Dynamical Objects may be indicated in focal level semiosis" (p. 143). However, this double determination process of potential and boundary conditions taking place at the focal level lead the authors to include a necessary distinction between *potentiality* and *actuality*. In this sense, it is possible to talk about a 'potential Sign', a 'potential Object', and a 'potential Interpretant'. In the first case, a potential Sign is something that *may* be the Sign of an Object to an Interpretant; in the second case, a potential Object is something that *may* be the Object of a Sign to an Interpretant; and finally, a potential Interpretant is something that *may* be the Interpretant of a Sign. Consequently, the micro-semiotic level is the domain of potential Signs, Objects, and Interpretants. I will recover this idea later on when I discuss the levels of semiosis proposed by Brier (2008), however for the authors,

> … we can consider a whole set of W of possible determinative relations between these three elements, which can generate, in turn, a set of possible triads. These triads cannot be fixed, however, by the micro-semiotic level, since the latter establishes only the initiating conditions for chains of triads at the focal level. To fix a chain of triads, and, consequently, the individual triads defined within that chain, boundary conditions established by the macro-semiotic level should also play their selective role. That is, networks of chains of triads constitute a semiotic environment or context which plays a fundamental role in the actualization of potential chains of triads. Chains of triads are actualized at the focal level by a selection of those triads which will be effectively actualized among those potentiality engendered at the micro-semiotic level. After all, a triad ti = (Si, Oi, Ii) cannot be defined atomistically, in isolation, but only when embedded within higher-level structures and/or processes, including both chains of triads T = {…, ti − 1, ti, ti + 1,…} and networks of chains of triads ST = {T1, T2, T3,…, Tn} (El-Hani et al. 2009, p. 144–145).

With what has been stated so far, it is possible to formulate a precise definition of semiotic and communicative systems, as both systems are very important for this framework of study. Following the authors' model,[3] which is also based on Peircean semiotics, it is possible to argue that a semiotic system emerges from the external and relational quality that signs in order to link with other signs, as well as their internal quality of connecting I, O, and R, which in turn can be seen as the emergence of semiosis internally and externally produced, that is, the semiosis produced among signs and within signs. In this sense, the systemic nature explicitly states the importance of relations rather than entities, and makes it possible to conceive semiotic systems as systems of interrelated signs that share the same ground or Object of reference, which in turn can also be seen as a chain of triads related by the same biological, artificial or logical principle. Then, it is important not to confuse a semiotics System with an observer, from the semiotic point of view, for in the first case we have a "stable" chain of triads (signs) while in the second case we have a system capable of using, producing, reproducing and understanding that chain of triads within its own biological, artificial or human nature. However, at the same time, a semiotic system can be conceived as a system that is causally affected by the presence of signs and, in consequence, can also be understood as a system in which the main activity is the production of semiosis. This second approach indicates that a semiotic system can be construed both as a stable set of related signs grounded on a general principle, and as a system capable of using, producing, understanding and, in some sense, *reacting* to the presence of signs.

[3] For a visual representation of the model see El-Hani et al. (2009), p. 145.

Then, a semiotic system is a set of signs and sign processes of different nature grounded on a particular principle related to its own logical, biological or cultural nature that makes the emergence of semiosis possible through the actualization of potential signs, triads, chains of triads and networks of chains of triads. A semiotic system is fundamentally a logical system but in order to operate as a system capable of recognizing, using or understanding signs it has to be actualized in a particular domain of reality. For example, we can consider living organisms as semiotic systems, which suggests the need to refer to them in terms of biological semiotic systems whose operations are biologically determined, and in the case of human beings, we can talk in terms of human semiotic systems that are biologically and culturally determined. In addition, this definition is also important for the clarification of communicative systems and the way they are related to semiotic systems, since the former is related to communication processes (communication) and the latter is related to semiotic processes (semiosis). For this reason, I consider that at this point it is extremely important to distinguish between communication and semiosis.

According to Dario Martinelli (2007) in his handbook proposal of Zoosemiotics (the field of semiotics applied to the animal kingdom) what usually happens is that we tend to confuse semiosis and communication just because communication is the most evident and predictable manifestation of semiosis. For Martinelli (2007), communication should be understood as just *one form* of semiosis and not as the semiotic process as a whole. However, I do not agree with Martinelli's proposal, since I consider that communication and semiosis cannot be considered separate from each other, but rather always operating at the same time and on the same theoretical and empirical level.

Thus, both of them are related to the same phenomenon but they partake it in a very different way. According to John Deely (2006), from the semiotic standpoint we do not directly study sign *action* in the natural and cultural worlds, but only the *knowledge* of that action in so far as it is consistent with the systematic body of knowledge we tend to call semiotics. Then, semiosis is a way to name a particular aspect of a process in which something is functioning as a sign for an observer but it does not explain the nature of the action itself, and that is where communication is a key element since that action is, in fact, communication.

As mentioned before, Semiosis and Communication are two sides of the same phenomenon and they cannot be separated in empirical research, but given that they share the same ontological dimension it is easy to confuse them. Thus, since semiosis requires as a minimal condition the presence of an observer to whom something functions as a sign, communication is the action in which something is operating as a sign. As I have already argued, an observer is a Semiotic System and it is not necessarily related to human beings but to anything capable of using, producing, reproducing or recognizing something as a sign. Communication is action and Communicative Systems are sets of elements involved in a particular action. Communication and Semiosis share a theoretical and methodological environment but they describe different aspects of the same phenomenon. In other words, a communicative system is a set of general principles regarding a particular kind of system (logical, biological, or cultural) that makes possible the interaction between elements through the actualization of relations by sign action and, by extension, defies the decomposition of a system. In this sense, if a semiotic system is capable of actualizing signs, triads, chains of triads and networks of chains of triads it is because there is a set of general principles – a Communicative System – that allows the system to actualize them through action. As we can see, both semiotic and communicative systems are involved in the process of meaning production, reproduction, and actualization, which are the basic operations of the three systems I have proposed. For this reason, I find it necessary to clarify that thus separation is only for methodological purposes. Through the combination of Semiotic and Communicative systems we have as a result a "meaningful action", regardless of the nature of the systems and of who or what the observer is. In the end, *both systems are related to the emergence of semiosis through sign action*.

Now, allow me to briefly summarize what I have argued so far. In the first section, I explored how communication can be defined from the cybernetic point of view and from which communication was conceptualized as that what defies the decomposition of a dynamic system, and that what makes the behavior of one variable incomprehensible without references to the behavior of the others. In the most complex system, those identified as autopoietic –or systems of production in Krippendorff's terms– communication is explained in what the production of and/or by a whole system differs from the production of and/or by its component parts. Including how the interaction of components copies, reproduces or produces itself in space. In systems of production, communication is the ingredient of material organization. However, as I have argued before, these definitions do not explain what is the relationship between communication and meaning-making processes or what are their main differences and complementarities. In order to explore those problems, I discussed some basic notions of semiotics and Peircean semiotics from which communication was defined as a system and as a set of general principles regarding a particular kind of system (logical, biological, artificial) that makes the interaction between elements possible through the actualization of relations by sign action. Following Sebeok's main argument in which he considers that there could not have been semiosis prior to the evolution of life, it is also possible to argue that there could not have been communication prior to the evolution of life, rather that once a living organism was established it is possible to consider that the three systems evolve together: biological systems, semiotic systems, and communicative system.

Just as semiosis can be identified in the inner world in the form of endosemiosis and to study its evolution towards social semiosis, it is necessary to find out the same idea regarding the communicative phenomena. Is it possible to find communication in the same dimensions semiosis is located? And, again, as Winfried Nöth (2014) has pointed out, "Are all process of semiosis processes of communication?" (p. 97). I will explore precisely the relationship among communication, semiosis and living organisms in the following section based on Søren Brier's proposal, since from my point of view, cybernetics and semiotics are not opposed but complementary perspectives, however, an epistemological integration is still needed, and that is what cybersemiotics is about.

3.4 Describing Communication from the Point of View of Cybersemiotics

According to Søren Brier (2008), the first problem concerning the information and semiotic paradigms is that both are connected to cognition, information, meaning and communication but from a different perspective. The former, often referred to as the "information processing paradigm", has been constructed on an objectivist conception of information combined with a computational approach in an algorithmic sense, which makes it a mechanistic and rationalist paradigm, however, this mechanistic approach cannot offer an understanding of human signification or its biological, psychological or social conditions, which makes the need for a universal science of information (one that is capable of including all these aspects into a general theoretical framework) evident. This is what led Brier (2008) to question "whether the functionalistic and cybernetic research must be viewed as complementary to a phenomenological-hermeneutical-semiotic line of theorizing on signification and meaning that ignores ontological questions outside culture, or whether these might be united within one paradigmatic framework through a revision of the ontological and epistemological foundations of both classical and modern sciences, as Peirce attempts" (p. 37).

As I have argued before (Vidales 2017a), although the mathematical theory of communication, the first integrative proposal in the history of communication theory, defined information as a statistical property of a particular message, it was very clear in pointing out that the meaningful dimension of a message was irrelevant to the theory.[4] Therefore, the important aspect was that the actual message is the one selected from a set of possible messages, which implies that a system must be designed to operate for each possible selection and not only for the one that will be actually chosen since this is unknown at the time of the design. In consequence, the "meaningful" aspect of messages was irrelevant to the theory, something that can be considered as the first conceptual problem inherited by it. However, at the same time, the mathematical theory proposed a concept of information within a very clear framework, which can be seen as one of its most important contributions to modern information sciences. The second integrative proposal is the one derivative from cybernetics, a theoretical proposal that I have explored in detail in the first section of this text.

However, Brier (2008) considers that some of the research done on systems, cybernetics and information sciences was built on metaphysical notions that led to a vague type of functionalism, and they do not take a clear stand on first-person

[4] "The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point. Frequently the messages have *meaning*; that is they refer to or are correlated according to some system with certain physical or conceptual entities. These semantic aspects of communication are irrelevant to the engineering problem. The significant aspect is that the actual message is one selected from a set of possible messages. The system must be designed to operate for each possible selection, not just the one which will actually be chosen since this is unknown at the time of design" (Shannon 1948, p. 379).

experience, the qualia of perception and emotions, and the problem of free will. "Modern versions of the pan-informational paradigm often combine functionalism with non-equilibrium thermodynamics, non-linear systems dynamics, deterministic chaos theory, and fractal mathematics as descriptive tools. But again, we seldom encounter systematic reflection on how these versions differ from mechanistic views […] or on the nature of a concept of meaning and how signification arises in mind" (Brier 2008, p. 39–40). This is why a signification theory is needed and the reason why Brier integrates the semiotic and the informational paradigms.

The importance of the semiotic paradigm is that it is focused on the possibilities of meaningful communication in living and social systems –through the search for answers about communication and meaning production in the cultural and historical dynamics and also in the biological conditions of meaning emergence. As I have pointed out in the first section, it is possible to consider consciousness, perception, and the observer in the very process of knowing from the standpoint of second-order cybernetics; however, it is not clear how meaning emerges from this perspective and what its relation to communication processes is.

Peirce founded semiotics as a general logic that integrated a general theory of sign production which helped expand semiotics beyond the human scope and into sign processes within all types of systems, including (of course), living systems. For Peirce, "it seems a strange thing, when one comes to ponder over it, that a sign should leave its interpreter to supply a part of its meaning; but the explanation of the phenomenon lies in the fact that the entire universe, not merely the universe of existents, but all that wider universe, embracing the universe of existents as a part […] is perfused with signs, if it is not composed exclusively of signs" (CP 1. 573–574) (Peirce 1931–1935). Later on, Brier (2008) suggests that in the semiotic philosophy of Peirce, feelings, qualia, habit formation and signification are basic ontological constituents of reality, which means that the semiotic paradigm should be able to penetrate beyond chemistry and physics, a movement that has been seriously developed in biosemiotics research, at least regarding living systems (Hoffmeyer 2008; merrell 1996, 2013; Sebeok 2001a, b; Martinelli 2007; Favareau 2010).

But if we consider, as Brier does, that it is possible to assume from Peirce's sign theory that meaning is a basic component of reality that allows the semiotic paradigm to penetrate beyond chemistry and physics, then it is necessary to explain if that indicates that meaning has, in fact, a biological, chemical, physical, social and cognitive components or if it is possible to identify meaning processes at a biological, chemical, physical and cognitive levels. These are two very different alternatives, but the former is the one I believe could lead us to an integrative vision if we consider Peirce's Synechism and the idea of "Scales" rather than "levels" (West 2017), as I will argue in the last section.

According to Brier (2008), information, matter, and energy are the three basic elements of reality, which implies that natural and objective information had to be present before the emergence of human minds and, in this sense, information is something more important than the observer or its interpreter. "Information is viewed as an objective and universal law-determined thing that both humans and machines absorb into their minds from nature, change by thinking, and bring it to society throughout language" (Brier 2008, p. 54). However, in order to explore this possibility, it is first necessary to explore the human mind as first-person experience, intelligence and meaning communication –in terms of information, consciousness and sense production– or the reality of first-person consciousness which implies that information sciences must include what has been already developed in semiotics and cognitive sciences[5] in order to solve some of the epistemological problems generated by the theoretical integration in an empirical way, particularly because information sciences in the subject area of living systems and humans will not be able to explain vital aspects of cognition and communication phenomena such as meaning, and the constraints of the social context.

On that account, for Brier (2008), the difference between knowledge and information is the fact that information is seen as a minor aspect of knowledge systems, however, they both need a process of semiotic interpretation in order to be meaningful, and thus, it is not possible to consider the meaning of information without the process of signification. Wiener argues that "information is information and not matter or energy", but Brier adds "*information is also not meaning until it has been interpreted by a living system*" (Brier 2008, p. 76). This is why Brier (2008) recognizes the need for a different and more sophisticated theory capable of including the cybernetics point of view, as well as a theory of signification in a coherent and integrated framework: "such a theory must be supplemented by a theory of signs and signification, as well as by theories about those biological and social systems for which the difference can make a difference, as cybernetics largely address the circularity of differences in self-organized systems […] to go deeper into an understanding of the process, we must analyze the whole process of sign making, as C.S. Peirce does in his semiotics" (p. 94).

Cybernetics sees information as an internal criterion of an autopoietic system in response to a perturbation, but "only in established structural coupling can signs acquire meaning. *Second-order cybernetics brings to semiotics the idea of closure, structural coupling, interpretation and languaging*" (Brier 2008, p. 98). Consequently, a paradigm of information, cognition, and communication also needs to integrate first-person consciousness embodied in a social context in the processes of meaning production in its attempt to build a framework capable of integrating information, cognition, sense, and meaningful communication. In the process of connecting information and human consciousness to its biological nature, is that a signification theory is needed, but also a theory of how meaning is produced in living systems, which is exactly the main interest of biosemiotics, a proposal that integrates Peirce's semiotics to a biological theory of life and evolution. Biosemiotics

[5] "Cognitive Sciences as a research program found its calling in the 1970s, but even before then, in the postwar years, it was an element in the scientific dissemination of the humanities. 'Cognitive Sciences' means the 'Science of Cognition' – that is, the sciences of epistemological processes. The very name reflects the hope that the science can wrest parts of epistemology away from philosophy, as has been case in other areas – such as psychology – that over time have been diverted from philosophy" (Brier 2008, p. 52).

is a response to the impossibility of cybernetics and information sciences to include consciousness and the phenomenological world into the explanation of living organisms.

For Brier (2008, 2009, 2010), the consequence of these omissions is that humanities, natural and social sciences are transformed into knowledge systems unable to explain their own foundation and who ignore the evolutionist origins of cognitive and communicative human abilities, as well the role the observer plays in the observation process, which in turn, generates a world without the conscious subject, just as Krippendorff (2009) pointed out. This is why it is extremely important to argue that consciousness, meaning, and communication are also natural phenomena related within a continuum, i.e., inside a particular type of connection between mind and matter, but also between nature and culture. From Peirce's Synechism (the tendency to regard everything as continuous), consciousness and matter can be considered as two ends on a continuum, which includes mind and matter, as well as individual embodied and social mind. In consequence, Brier (2009) considers that there cannot be a theory of signification without a theory of mind that places consciousness centrally in one's ontology. From his point of view, there are three basic frameworks: (a) one based on a cybernetic informational worldview, as argued on the first section, which is derived from a sort of basic physicalistic ontology that considers within its complexity the emergence of life followed by cognition, and therefore is able to consider consciousness, qualia and feelings. (b) a second one related with autopoietic processes, i.e. the self-creating organizationally closed systems, and (c) the Niklas Luhmann's triadic autopoietic system theory, which attempts to integrate the two previous frameworks (Brier 2009).

Based on Bateson's cybernetic theory of mind, Maturana and Varela's autopoietic theory as well as on Husserl's phenomenology, Luhmann's theory is trying to solve the problem of qualia and first-person consciousness and its involvement in communication and language by introducing an understanding of the psyche and socio-communicative systems as autopoietic systems. Luhmann clearly distinguishes living systems or biological systems (cells, brains, organisms, etc.), psychic systems and social systems (societies, organizations, interactions) as different kinds of autopoietic systems –which should be perceived as a way of understanding different types of systems or as different types of autopoiesis and not as describing an internal system's differentiation. For Brier (2008), Luhmann defines the three as closed systems –closed towards one another as well. "Although all three are present and function simultaneously in human beings, there are no direct 'inner connection' among them as systems; they communicate only through interpenetration. This is an elegant cybernetic formulation of the organizational reasons behind the difficulty of integrating the autopoiesis of self-consciousness, the body-mind, and social communication through language" (p. 237). From this perspective it is important to point out that communicative systems are autonomous and have their own intrinsic form of closed organization, two conditions that transcend both biological and psychological autopoiesis, and this is the reason why Luhmann considers that social systems use communication as their particular mode of autopoietic reproduction, since their elements are communication that is recursively produced and reproduced by a network of communications and that cannot exist outside of such a network. For Luhmann, communications are not "living" units, are not "conscious' units, and are not "action", furthermore, communication is not a process of "transferring" meaning or information, on the contrary, "it is a shared actualization of meaning that is able to inform at least one of the participants… What remains identical in communication, however, is not a transmitted, but common underlying meaning structure that allows the reciprocal regulation of surprises" (Luhmann in Brier 2008, p. 239–240).

For Luhmann, it is possible to think about a theory of social communication systems as autopoietic systems since social systems use communication as their particular mode of autopoietic reproduction, in addition, the human phenomenon of communication and the production of meaning can be explained as reproductive representations of complexity –avoiding the idea of meaning as something subjective, psychological or transcendental and allowing us to review them in a systems-theoretical way.

It is then, from Luhmann's perspective, that Brier (2009) suggests what he considers the cybersemiotic model of cognition and communication, which presupposes that in the human realm biological autopoiesis, psychological autopoiesis, and a socio-communicative autopoietic system (language games) work in-between human beings (intersubjectivity). The three autopoietic systems have mutual structural couplings, and the idea of cybersemiotics is "to view the interpenetration between the three organizationally closed systems as a semiotic phenomenon" (p. 48), since signs acquire their meaning just where the systems interpenetrate. From cybersemiotics, signs and language games arise on the basis of the interpenetration of the three autopoietic systems, in such a way, that three levels of communication result: "(1) A behavioral reflexive level of bodily coordination… (2) A level of instinctively based signs games depending on motivated anticipatory felt significations… (3) The socio-linguistic level based on language games" (p. 48).

According to Maturana and Varela, interpenetration is a process that develops over time, generating a coordination of behavior that they called *languaging*, which is the biological connection between two individuals in a social species, but it is not a sign nor a language game, is the necessary environment for the development of communication as a signification system with its own organizational closure (Brier 2008, 2009). Now, in an attempt to integrate Luhmann's theory of the human social-communicative being as consisting of three levels of autopoiesis, from the standpoint of cybersemiotics it is also possible to distinguish the following: (a) the languaging of biological systems (coordination of behaviors between individuals of a species at a reflexive signal level), (b) the motivation-driven signs games of psychological systems, and (c) the language games of self-conscious linguistic human beings through the generalized media of socio communicative systems (Brier 2008, 2009). Then, it is possible to assume an exosemiotic level of relations among living organisms, that in the particular case of the human being, it is established by mutual structural couplings, the socio-communicative autopoietic language games, the sign games and the cybernetic languaging through signals. "We should therefore distinguish between language games, sign games and the level of reflexes: languaging"

(Brier 2009, p. 48). From this perspective, Brier proposed the *signification sphere*, a cybernetic concept that delineates the cognitive domain of a living system (including the biological and psychological systems) and that makes it different from the rest of the environment –which is basically experienced as noise.

What we have then is a description of three closed autopoietic systems (biological, psychological and social-communicative) that interpenetrate each other and between them when it comes to relations between human beings (mutual structural couplings, the socio-communicative autopoietic language games, the sign games and the cybernetic languaging through signals) which can be seen as a way to integrate social system's theory with semiotics and cybernetics in a description of autopoiesis and external semiosis. However, we have to keep in mind that there is also an internal semiosis process, as Sebeok (2001a, b) suggested decades ago, identified under the name of endosemiosis, as I have described in the previous section. While exosemiosis is describing the sign process that occurs *between* organisms, endosemiosis denotes the semiosis process that occurs *within* organisms. It is from this perspective that Brier (2008) introduced the term *thought semiotics* as a way to name the interaction between the psyche and the linguistic system, mainly because "This is where our culture, through (mostly) linguistic concepts, offers possible classifications of our inner feelings, perceptions, and volition" (p. 395–396). It is also important to notice that, (a) these inner states in their non-conceptual or prelinguistic states are not recognized by conceptual consciousness, which is related with our life world, a condition Brier (2008) calls *phenosemiotic processes* or *phenosemiosis*, and (b) as the interaction between the psyche and the body are internal, but not purely biological as in endosemiotics, Brier (2008) calls the semiotic aspect of the interpenetration between biological and psychological autopoiesis *intrasemiotics*. In his words, "These terms remind us that we are dealing with different kinds of semiotics, not absolute qualitatively different systems. We need to study more specifically how semiosis is created in each instance" (p. 396). Finally, Brier (2008) introduced the term *ecosemiotics,* based on Winfriend Nöth's proposal, to designate the signification process of non-intentional signs from the environment or other living beings (a process that creates meaning for another organism). As a result, for the author,

> we are forced to supersede the old version of the cognitive science based on the use of the model of physical information science and develop theories that can take us a level beyond it to living, feeling and willing systems with spontaneous cognition. The aim is to develop a broader, transdisciplinary, and more evolutionary framework for studying the development of cognition, communication and knowledge in the human life-world. This is necessary to integrate knowledge from the sciences with knowledge produced in the humanities and social sciences about communication, meaning and language in order to gain a deeper understanding of the social production of knowledge and rationality (Brier 2010, p. 1912).

And this is, precisely, the basis of cybersemiotics. Nevertheless, if we are interested in developing a general theory capable of explaining semiosis and communication processes in living organisms from the biological to the social, human, cultural and cognitive levels, it is extremely important to explain what those levels are and how they associate, as well as, how communication and semiosis are both connected and differentiated theoretically. In other words, the question is how to develop a transdisciplinary framework where both a scientific theory of nature and a theory of communication and meaning can be integrated alongside an evolutionary theory of levels of semiosis (Brier 2009). Now, having described the main idea of systems cybersemiotics proposed from cybernetics and semiotics and its interrelations, it is important to develop a final argument associated with the idea of levels of semiosis propped by Brier (2003, 2010), or what he calls "the heterarchical levels of evolutionary cybersemiotic emergence".

In his proposal, Brier (2010) considers that cybersemiotics is a proposal that unites cybernetic, systemic, informational, and semiotic approaches towards self-organization, selection of differences, and constructivism. However, the modern vision system thinking has on nature is based on multilevel, multidimensional hierarchies of inter-related clusters forming a heterogeneous general hierarchy of processual structures or a heterarchy. According to the author,

> Levels are believed to emerge through emergent processes, when new holons appear through higher-level organization. I have been skeptical about the ability of this paradigm to account for the emergence of life and sense experience and later linguistically borne self-consciousness. But if this system and cybernetic view is placed into a Peircean framework, where living potentialities (Firstness) are processes manifested through constraints and forces (Secondness) into regularities and patterns (Thirdness) in a recursive manner from level to level, it makes much more sense. The new emergent level then acts a potential for the development of the next level. Levels can form and dissolve when their dynamical parameters are near critical points. Stabilization requires that the system moves further from the critical point into organizational patterns, like energy wells. But one then has to accept a Hylozoist view of matter as Hylé (Brier 2010, p. 254).

It is from this perspective that Brier (2008, 2010) proposed the five basic ontological concepts that describe, in turn, the five cybersemiotic levels made by the integration of Peirce's semiotic philosophy. The first level is of a physical nature and is described as quantum vacuum fields entangled by causality, however, it is not considered to be physically dead as in classic physics, on the contrary, from the Peircean view, it is part of Firstness which also holds qualia and pure feeling.

Even when this perspective could be problematic for some physics, this is one of the most mysterious levels we have encountered and that claims for different forms of explanation. The second level is related to Peirce's Secondness and is of efficient causation. This level is ontologically dominated by physics (kinematics and thermodynamics), but it is also considered by Peirce as the willpower of mind and by modern information science as the differences, which, when interpreted, can become significant and meaningful. In addition, the third level is a protosemiotic level of objective information where the formal causation manifests itself clearly, and it is ontologically characterized by chemical sciences and concepts of pattern fitting. The fourth level is related with Peirce's Thirdness and it is where life is self-organized and where semiotic interactions emerge, initiating internally in multicellular organisms in what has been called endosemiosis and between organisms as sign games. In this level, information can be useful in analyzing life at the chemical level, but from a biosemiotic perspective it is not sufficient to capture the communicative, dynamical organizational closure of living systems. Finally, the fifth level is where the human self-consciousness emerges through syntactic language games, bringing along rationality, logical thinking and creative inferences (intelligence).

Cybersemiotics recognizes the meaningful aspects of the world and of human life as the limits of information theory and cybernetics since "the meaning of information is not information and the information of meaning is not meaning when we only use the term information physicalistic" (Brier 2010, p. 1914). On the contrary, it is possible to argue that the meaning of certain information is defined by the difference that someone experiences from it, therefore, meaning could be seen as the difference that a sign makes to somebody in the world, as it represents something in a way or another, as Peirce suggested. Meaning is a concept that entails the perception of signs but also the understanding of communication, which implies, in turn, the need to find out to what extent it is possible to have information without meaning or, on the contrary, if information is always a particular aspect of meaning. According to Brier (2010), "there is a field of information in the cybernetic world, but there is no field of meaning, as cybernetics and autopoiesis theory do not have a theoretical definition of first-person consciousness as part of their paradigm […] The meaning of information is not informational, but semiotic in the Peircean sense and meaning is therefore not comprehensible to information science" (p. 1915).

In consequence, Brier (2008) argues that traditional information and communication analyses based on data and theories of information transmission have several problems when trying to answer questions about the way knowledge systems are organized and constructed. According to the author, new ways to conceptualize communication could be helpful in understanding the development of social systems as self-organized and self-produced networks. Then, instead of an explanation based on the communication of information, the author proposed an explanation based on the processes of *conjointly actualized meaning*. This is where the need of a triadic theory of signification, such as that proposed by Charles Sanders Peirce, is recognized and which can be seen as an attempt to provide a theory of signification to systems and cybernetics thinking, and as a very important integration towards the construction of a framework for the study of meaning emergence. According to Brier (2008),

> Meanings, then, are the result of a coupling process based on joint experiences. This is an important foundation for all languages and all semiosis. Words do not carry meaning; rather, meanings are perceived on the basis of the perceiver's background experience. Percepts and words are not signals; rather, they are perturbations whose effects depend on system cohesion. After a long period of interaction, a concept acquires a conventional meaning (Eigenbehavior) within a certain domain. The perception and interpretation of words force choices that open up opportunities for action and meaning.
>
> This conception is complementary to 'the transmission model,' in which one imagines packages of information sent via language from a sender to a receiver. In the cognitive view, this is modified so as to consider that which is sent as only *potential* information. In second-order cybernetics, biological and social contexts are made explicit through the theory of

> autopoiesis, and there is a clear understanding of the paradigmatic origins of knowledge from different knowledge domains (p. 87).

As previously argued, it is possible to assume that the meaning of a particular type of information is defined by the difference experienced by a system. That is to say, "meaning" can be conceived as a term that suggests sign perception and the understanding of communication, which implies that "meaning" is a difference realized in the world by a sign that stands for something in some respect or capacity, as argued by Peirce. Then, Shannon's information concept is useful to explain communication processes in the engineering field but not in the attempt to formulate a scientific basis for a general information theory. Therefore, Brier (2010) concludes that there is a field of information in the cybernetic world, but there is no field of meaning, and he also recognizes the importance of semiotics as a general theory of meaning emergence and sign production. As a result, the question of meaning emergence has been shifted from social sciences to biology and has developed the new field of biosemiotics (Hoffmeyer 2008).

Having presented some of the basic ideas of cybersemiotics, it is important to point out that communication from this framework seems to be related with Luhmann's socio-communicative autopoietic system, however, it is my intention to propose that meaning and communication are two basic processes that cannot be separated and that are the result of the interpenetration of the five cybersemiotic levels. This implies that they are not located in a particular level, but it is possible to find an "expression" of them in each level. Both, communication and meaning have their origins in the very nature of biological organisms, as endosemiosis, but they all go through the psychological and cognitive dimensions of semiosis having their complete realization in social semiosis and in the domain of Lotman's semiosphere. This is why I consider that what we need is a transdisciplinary concept of communication capable of moving from the biological to the psychological, cognitive and social domains in order to avoid limiting communication to a particular domain or level of reality; however, what is still lacking is an explanation of the physical and chemical levels of reality. Nevertheless, this is also useful not only when it comes to biological, psychological or social phenomenon, but also when it comes to scientific and disciplinary domains. Then, my final argument is precisely the proposal of communication as a transdisciplinary concept.

3.5 The Need for a Transdisciplinary Concept of Communication

As I have argued before (2013, 2015, 2017a, b) and stated in the introduction of this chapter, my intention is to explore the possibility and need of moving from the consideration of communication as an academic field to the consideration of communication as a transdisciplinary concept in order to understand how it is expressed in the various levels of reality involved in the meaning-making process. This suggests the possibility of moving in, moving towards and moving across the five heterarchical levels of evolutionary cybersemiotic emergence– from endosemiotics and phenosemiotics, to exosemiotics, cognitive and social semiotics. This consideration assumes the inclusion of a new and particular vision about objects of knowledge and about the knowledge construction process. Objects of knowledge allude to transdisciplinary concepts, i.e., "concepts which serves to unify knowledge by being applicable in areas which cut across the trenches which mark traditional academic boundaries" (Checkland in François 2004, p. 632). Objects of knowledge have an abstract configuration that it is not particular to any theory or field of knowledge, instead, they are conceptual constructs objectivized in a particular theory and field but that can be extended beyond one particular discipline, and beyond levels of cybersemiotic integration. This means, as I have argued before, that communication is not a social, biological, cognitive or physical phenomenon, but that communication is a process that involves a social, biological, cognitive, and physical component and the fact that some components are highlighted in particular processes or research projects is a matter of scales and not of levels of organization. The same could be said about semiosis. Semiosis and communication emerge as a result of the five cybersemiotic levels, and the fact that we focus in a particular level rather than in another is just a matter of scales (West 2017) and does not imply that they are ontologically defined in a particular domain of reality either biological, social or physical.

According to François (2004), these general concepts or models are identical representations obtained from specific situations, interrelationships or processes. Each discipline studies its problems on its own terms; nevertheless, there are some common features that underlay apparent dissimilar situations or configurations, and that is what the construction of general frameworks and transdisciplinary concepts consist of and the reason why communication can be defined as a transdisciplinary concept. As I have argued in previous sections, communication can be defined from the cybernetic point of view as that what defies the decomposition of a dynamic system, and that what makes the behavior of one variable incomprehensible without references to the behavior of the others. In the most complex system, those identified as autopoietic systems, communication explains in what the production of and/or by a whole system differs from the production of and/or by its component parts. Including how the interaction of components copies, reproduces or produces itself in space. In autopoietic systems, communication is the ingredient of material organization. On the other hand, from the semiotic point of view, communication is defined as a system and a set of general principles regarding a particular kind of system (logical, biological, and artificial) that permits the interaction between elements through the actualization of relations by sign action. Following Sebeok's main argument in which he considers that there could not have been semiosis prior to the evolution of life, it is also possible to argue that there could not be communication prior to the evolution of life, but once a living organism was established, then it is possible to consider that the three systems evolved together: biological systems, semiotic systems, and communicative system.

What has been described before are some of the main features we have to examine if we want to consider communication as a transdisciplinary concept, however, we still have to explain how this is related with the five heterarchical levels of evolutionary cybersemiotic emergence described before. How can communication be related with the first and second levels of physical nature, the third level of objective information, the fourth level of endosemiosis and signs games, and the fifth level of the human self-consciousness? Brier (2008) clearly suggests that exosemiosis, endosemiosis, phenosemiosis and intrasemiosis are terms that remind us that we are dealing with different kinds of semiotics, not absolute qualitatively different systems, a situation that implies the need to study more specifically how semiosis is created in each instance. However, my main thesis is that communication is a key concept to understand how it is possible to identify the movement within and across levels of reality based on the idea of scales rather than on the idea of levels itself. Moving from the physical and biological levels to the cognitive and social ones is an effort that describes scales of reality in all levels and semiotic processes involved. In explaining social semiosis there is implicitly an endosemiotic level involved as Sebeok argued long time ago, but focusing our attention in social semiosis, endosemiosis, sign games or phenosemiosis is just a matter of scales and not of levels, since at least the fourth levels are present in each communicative and semiotic phenomenon described. This is why I have mentioned before that communication is not a social, biological, cognitive or physical phenomenon, but a process that involves a social, biological, cognitive, and physical component and the fact that some components are highlighted in particular processes is a matter of scales and not of levels of organization.

The main argument is that the idea of scales could make possible the recognition of the emergence of similarities or isomorphism in each level regarding semiosis and communication processes, something that it is not clear enough when the explanation comes from the idea of levels and hierarchies, even with the proposal of heterarchical levels. Different from cybernetics and semiotics, Geoffrey West (2017) reflected on the idea of scales and scaling from the point of view of complexity science, the science of emergent systems and networks, and he asked some questions that are closely related with those made by cybersemiotics as well. "Could there conceivably be a few simple rules that all organisms obey, indeed all complex systems, from plants and animals to cities and companies? Or is all of the drama being played out in the forest, savannahs, and cities across the globe arbitrary and capricious, just one haphazard event after another?" (p. 2). The answer to these questions is precisely the idea of scales. According to West (2017), there are an enormous number of scaling relationships that quantitatively describe how almost any measurable characteristic of animals, plants, ecosystems, cities, and companies scales with size. Scaling and scalability is how things change with size, an idea that can be applied for investigating the implication of scaling in semiotic and communicative processes from cells to humans to societies. "The existence of these remarkable regularities strongly suggests that there is a common conceptual framework underlying all of these very different highly complex phenomena and that the dynamics, growth, and organization of animals, plants, human social behavior, cities, and companies are, in fact, subject to similar generic 'laws'" (p. 5).

For West (2017), there is a close relationship among scaling, complexity, emergence, and self-organization. A complex system is defined as a system composed of myriad individual constituents or agents that once aggregated take on collective characteristics that are not usually manifested in, nor could easily be predicted from, the properties of the individual components themselves. Even when complex systems do not have concepts of experience and meaning, this idea is in correspondence with how humans being are described from biosemiotics and cybersemiotics, and with Sebeok's (2001a) recognition of our own body as an almost invisible network of semiotic processes. The description of endosemiotics to exosemiotics seems to be the description of a complex system and, in consequence, it could also be addressed as a matter of scales. In addition, West suggests that a universal characteristic of this kind of systems is that the whole is greater than, and often significantly different from, the simple linear sum of its parts. "In many instances the whole seems to take on a life of its own, almost dissociated from the specific characteristics of its individual building blocks. Furthermore, even if we understood how the individual constituents whether cells, ants, or people, interact with one another, predicting the systemic behavior of the resulting whole is not usually possible" (West 2017, p. 23). The collective outcome in which a system is manifesting other or different characteristics from those resulting of the integrations of their individual parts is called an *emergent behavior*, and the main characteristic of the resulting system is that there is no central control. Now, from the emergent behavior is possible to define also self-organization, that is "an emergent behavior in which the constituents themselves agglomerate to form the emergent whole" (p. 23).

In the process of scaling up from the small to the large, West (2017) argued that this process is often accompanied by an evolution from simplicity to complexity while maintaining basic elements or building blocks of the system unchanged or conserved. Could semiosis and communication be those kinds of elements that are maintained in the process of scaling the five heterarchical levels of evolutionary cybersemiotic emergence? These are the kind of issues that still need to be addressed. In the end, cybersemiotics presents itself as a new non-reductionist vision of cognition and communication that tries to solve the dualistic paradox of natural sciences, exact sciences and humanities by starting from a halfway point between semiotics cognition and communication as basic sources of reality where all of our knowledge is created, and thus, suggests that knowledge is produced within four aspects of human reality: "our surrounding nature described by the physical and chemical natural sciences, our corporality described by the life sciences such as biology and medicine, our inner world of subjective experience described by phenomenologically based investigations and our social world described by social sciences" (Brier 2013, p. 220). From the standpoint of cybersemiotics, there are four different types of historical explanations: the nomological, the biological evolutionary, the social-historical, and the personal-subjective, i.e., four areas of scientific knowledge that attempt to explain reality from their own perspective and, from my point of view, four areas that also describe different scales.

Therefore, the challenge as stated by Brier (2013), is to produce a new paradigmatic base that allows the integration of knowledge produced inside each one of these forms of explanation, in other words, a foundation that will allow the integration of knowledge from the study of the embodied conscience produced by exact sciences, life sciences, social sciences and humanities without reducing the result to only one view avoiding as much as possible any type of reductionism, from scientific to radical constructivist reductionism. Thus, Brier considers that "cybersemiotics constitutes a realistic foundation for a comprehensive understanding of the natural, life and social sciences as well as humanities and that it can provide a deeper understanding of the differences in the knowledge types they produce and show why each and every one is necessary" (p. 223). However, in its attempt to build a transdisciplinary framework of cognition, information and communication, cybersemiotics also needs to build transdisciplinary concepts in order to explain how such integration is possible and to be able to create bridges that allow us to move between and across levels, as well as from one scale of observation to another. Communication and semiosis are two of those concepts, and the need to think in terms of interdisciplinary knowledge is important and necessary for the task of theoretical integration. For Paul Cobley (2010), cybersemiotics is transdisciplinary not just because it is situated between science and humanities and because it evokes knowledge from both, but specifically, because it explores concepts that operate both in nature and culture. These concepts can be located at the most fundamental levels of life, like molecules and cells, as well as in the most complex social configurations like language and symbolic social dimensions.

Finally, as I have argued before (Vidales 2017b), this approach sets forth a completely different conceptual path from the one that we have followed in communication studies so far, thus, it entitles the need for other forms of historical reconstruction and of knowledge construction in contemporary communication research. What we cannot deny is that this approach represents a formidable challenge, since we still have to go through the critique of the foundations in our own historical narrative, and specifically, to start the dialogue with other fields of knowledge in the same level of our conceptual production. Correspondingly, and since theoretical discourse, per se, represents a problem for historical reconstruction, there still lays the need to show empirical evidence of the range and use of a proposal like this. However, it is also about recognizing that the conceptual space of communication exploited in richness and depth in the second decade of the twenty-first century. Communication actively works in border sciences, in contemporary science, and in explanations of life, society, cognition, and meaning. It might be the first time in history that it reaches its current state as a central element of life, which means that we must take a chance and stop reading history to start being part of its construction.

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Chapter 4
System, Sign, Information, and Communication in Cybersemiotics, Systems Theory, and Peirce

Winfried Nöth

Abstract The chapter outlines cybersemiotics in relation to the research fields of systems theory and semiotics in general. It introduces and defines the key concepts of the first, second, and third generations of systems theory and gives a survey of systems theoretical approaches to general and cultural semiotics. The author argues that the notions of system, communication, self-reference, information, meaning, form, autopoiesis, and self-control are of equal topical interest to semiotics and systems theory. In particular, the paper inquires into the way in which N. Luhmann, Maturana/Varela, and C.S. Peirce define and use these concepts and how these authors differ with respect to them.

Keywords Brier, S. · Communication · Cybersemiotics · Information · Peirce, C.S. · Semiotics · Sign · System · Systems theory

4.1 Cybersemiotics

Cybersemiotics is a transdisciplinary research field at the confluence of cybernetics, systems theory, semiotics, radical constructivism, biology, ethology, cognitive linguistics, communication theory, and the sciences of information and computation. Founded as a novel "transdisciplinary theory of consciousness, cognition, meaning and communication" (Brier 2013, p. 97) and advanced through Brier's "journal of second-order cybernetics, autopoiesis and cybersemiotics", *Cybernetics & Human Knowing*, the research field offers an umbrella for several current research tendencies. From information theory to semiotics, from first to second-order cybernetics, and from Heinz von Foerster's radical constructivism to Niklas Luhmann's

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constructivist theory of social systems, cybersemiotics aims at expanding the horizon of general semiotics outlined by Charles S. Peirce. Programmatically, Brier (2013) declares:

> Cybersemiotics proposes a new transdisciplinary framework integrating Peirce's triadic semiotics with a cybernetic view of information […]. 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 system's 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. In order to incorporate the sociological disciplines and contributions from multiple areas of applied research, cybersemiotics draws extensively on Luhmann's theories (p. 222).

Cybersemiotics adopts Peirce's phenomenology, semiotics, and evolutionary philosophy as basic tools in its project to integrate biology, ethology, autopoiesis theory, the theory of embodied cognition, and the theories of evolution and emergence under its transdisciplinary umbrella. Since the very broad scope of the project of cybersemiotics makes it impossible to pay due tribute to all of its purposes in a single chapter, the present contribution has to restrict itself to shedding some light on topics concerning four theoretical pillars of cybersemiotics: systems theory, communication theory, information theory, and the semiotic philosophy of Charles S. Peirce.

4.2 Systems Theory

General systems theory, according to its founder, Ludwig von Bertalanffy (1968, p. 90), is a transdisciplinary framework for such diverse research fields as cybernetics, information theory, game theory, decision theory, topology, factor analysis, and the branch of philosophy known as systems philosophy. Laszlo extended this list to include catastrophe theory, the theory of autopoietic systems, nonequilibrium dynamics, and synergetics (1972, p. 13; 1983). With Parsons (1951) and Bateson (1972), systems theoretical ideas began to spread in the social and behavioral sciences. The theory of autopoietic and self-referential systems introduced a new variant of systems theory in biology to the social sciences (Luhmann 1995a, b, 1997) as well as in literary and media studies (Schmidt 1997; Nöth 2011). Other tendencies of systems theory are the ones of dynamic systems, complex systems, and the theory of self-organization. The study of complex systems has also developed into a research field in mathematics and economics of its own known as the sciences of complexity. Furthermore, artificial intelligence, artificial life, ecology, the neurosciences, and research in neural networks in computer science have been subsumed under the umbrella of systems theory (Cruse 2009).

The concept of system has many facets, of which only those that have become key concepts in systems theory can be discussed here (for others, see Nöth 2000, pp. 208–215). According to Bertalanffy (1968, pp. 37–8), systems theory aims at discovering isomorphisms that explain how systems, from simple static to complex dynamic ones, are organized in such diverse fields as technology, physics, biology, and the social sciences. Today, systems theory looks back on a history falling into first, second, and third-generation research in systems for which different types of system and key notions are characteristic (Iba 2010, pp. 6613–6614). The systems in the focus of the first-generation scholars (Cannon, L. Bertalanffy, K. Boulding, G. Klir, A. Rapoport) are dynamic equilibrium systems. Among their key concepts are feedback, homeostasis, invariance, equilibrium, or self-stabilization. In sociology, first-generation concepts of systems theory were incorporated within T. Parsons's theory of social systems. The pioneers of cybernetics (N. Wiener, R. Ashby), the generation of the so-called first-order cyberneticist, is sometimes included in the first generation of systems theory, although Bertalanffy set store on emphasizing that the scope of general systems theory was different from the one of cybernetics (Drack and Pouverau 2015). Key concepts of the first paradigm of systems theory, with brief definitions, are the following:

(1) *System*. According to Hall and Fagen (1956), "a system is a set of objects together with relationships between the objects and between their attributes" (p. 18). Examples of systems include machines, cells, organisms, ecological habitats, persons, social groups, families, companies, legal institutions, languages, literatures, media, or cultures. For Bertalanffy (1975), a system is "a set of elements standing in interrelation among themselves and with the environment" (p. 159).
(2) *Wholeness, order, and invariance* are characteristics of systems according to the first generation of systems theoreticians (e.g., Bertalanffy 1968, p. 55). Every system is an ordered whole that cannot be reduced to the sum total of its constituent elements. "Order in a system refers to the invariance that underlies transformation of state and by means of which the system's structure can be identified" (Laszlo 1983, p. 28).
(3) *Open vs. closed systems*. First-generation systems theory defined biological organisms as open systems in the sense that they exchange energy and matter with their environment. As long as they live as open systems, they escape from decay through metabolism and by drawing information from their environment (Schrödinger 1947, pp. 70–2). Closed systems, by contrast, are isolated and without environmental input and output. Third-generation systems theory has an almost opposite conception of the "organizational closure" of systems (see below).
(4) *Equilibrium and stability*. Systems are in states of equilibrium that range from stability to instability. A stable equilibrium is one in which perturbations do not change the value of the variables of the system. After disturbances that do not amount to a catastrophe, they return to their previous state. Balls in a basin exemplify a system in such a state. Systems that move away quickly from the state of equilibrium even after only minor disturbances are in a state of unstable equilibrium. A house of cards exemplifies a system of this kind.

(5) *Homeostasis and flow equilibrium*. Homeostasis describes the ability of a system to stabilize itself dynamically at the level of a desired state (Cannon 1932). Open systems are in a flow equilibrium (Bertalanffy 1975, p. 127). After absorbing environmental influences (e.g., in the process of metabolism), they do not just return to their previous state, but attain a new state of equilibrium. When self-stabilization has a variable desired state, for example in the process of growth according a genetically determined program, its development is described as homeorhesis (Waddington 1957, p. 43).
(6) *Equifinality*. Bertalanffy defines the capacity of a living system to reach a desired final state in different ways from various initial states as equifinality (1968, p. 79). Equifinality characterizes the behavior of a living system in which "future goals are already present in thought and direct the present action" (Bertalanffy 1950, p. 140-141).
(7) *Information as negative entropy*. Entropy is a concept of the second law of thermodynamics. A closed system, isolated from its environment, tends towards entropy, a state in which the distribution of the molecules is entirely unpredictable and hence disordered (random). From thermodynamics, information theory adopts the concept of entropy and defines its inverse, negative entropy, as information (Shannon 1948). The more the elements of a system are ordered, the more information it contains. The more they are in disorder, the more the system lacks information.

Second-generation systems theory is concerned with processes of self-organization in dynamic nonequilibrium systems. The possibility of the emergence of order from chaos, as discovered by Prigogine in thermodynamic systems, is in its focus. Key concepts are "dissipative structure" (I. Prigogine), hypercycle, self-replication, autocatalysis (M. Eigen, in chemistry), and synergetics (H. Haken, in thermodynamics). The studies in dynamic processes in the framework of catastrophe theory have been included within this paradigm. Further key concepts are:

(1) *Self-organization* and *morphogenesis* (cf. Laszlo 1972). In contradistinction to self-stabilization, which maintains a system at a desired state by means of negative feedback (morphostasis), self-organization proceeds by means of positive feedback, too. In its morphogenesis, a self-organizing system grows by amplifying inner changes and adapting to perturbations from without in order to reach higher stages of development. In each phase of this process, there are nonequilibrium states requiring an enforcement of the mechanisms of self-stabilization (cf. Laszlo 1972, pp. 42–5). Self-organization presupposes a system with multiple equilibria and strata of potential stability (Laszlo 1983, p. 32).
(2) *Self-stabilization* is a key concept of dynamic systems theory. Negative feedback, already a key concept of first-generation systems theory, is the control processes by means of which a system maintains a desired state stable (cf. Laszlo 1972, p. 39). A thermostat, e.g., counteracts changes of temperature above or below a desired value by cooling or heating up the system. A system that aims at keeping a desired state stable is a *teleological* system.

(3) *Nonequilibrium dynamics* is no longer concerned with merely maintaining a system stable (Nicolis and Prigogine 1977; Prigogine and Stengers 1984). Instead, it describes systems in which spontaneous transformations from states of fluctuation and disorder far from equilibrium result in higher states of order and stability. In such processes, the stability of a system depends on the use or the dissipation of energy. The goal of maintaining a system stable is supplanted by the goal of permanent dynamic nonequilibrium states in processes of self-organization and evolution.

Third-generation systems theory originates with Maturana and Varela's (1980) biological theory of autopoiesis. Niklas Luhmann adopted and modified it in his theory of social systems. Second-order cybernetics (Bateson, von Foerster) and the ideas of the radical constructivists (von Glaserfeld, S.J. Schmidt) are often included within this paradigm. The project of cybersemiotics belongs to it (Brier 1996). The key concepts are:

(1) *System*. Maturana and Varela (1980) restrict themselves to the most lapidary definition of a system as "any definable set of components" (p. 138). For Varela (1979), systems are "machines", which allows him to distinguish between non-living and living machines, alias systems (p. 9).
(2) *Autopoiesis in biology*. Whereas nonliving machines are externally determined (allopoietic) systems, defined in terms of "inputs, outputs, and their transfer functions", living machines (i.e., organisms) are autopoietic or autonomous systems. "In an autonomous system, we find that its components are so strongly interrelated that it is this internal coherence and interrelatedness what is central […]. Instead of inputs and their transformations, one shifts to operational closure, as a characterization of the internal network" (Varela 1986, p. 118). For Maturana (1981), autopoietic systems are "unities as networks of production of components that (1) recursively, through their interactions, generate and realize the network that produces them; and (2) constitute, in the space in which they exist, the boundaries of this network as components that participate in the realization of the network" (p. 21).
(3) *Autopoiesis in nonbiological self-referential systems*. Luhmann accepts Maturana's definition, but supplements it as follows:

> Autopoietic systems, then, are not only self-organizing systems, they not only produce and eventually change their own *structures*; their self-reference applies to the production of other *components* as well. This is the decisive conceptual innovation. It adds a turbocharger to the already powerful engine of self-referential machines. Even *elements*, that is, last components (in-dividuals) which are, at least for the system itself, indecomposable, are produced by the system itself. Thus, everything that is used as a unit by the system is produced by the system itself. This applies to elements, processes, boundaries, and other structures and, last but not least, to the unity of the system itself. (Luhmann 1990, p. 3)

(4) *System and environment*. Luhmann rejects the definition of systems as a totality of the elements that constitute it as a whole, as the first-generation systems theoreticians taught. According to Luhmann's redefinition, a system needs to be conceived in terms of the difference between the system and its environment

(1997, p. 201). This difference is "created" by the system's operations, which are the constitutive elements of the system. "Only a system can operate and only operations can produce a system" (1995b, p. 27).

Systems theory is sometimes studied under the designation of *systems science* (Laszlo 1983; Mobus and Karlton 2014), but others have avoided referring to systems theory as a science. Instead of calling it as a *science* or an academic discipline, they prefer expressions such as "systemic thinking" (Emery 1969), "systemic approaches to", or "systems views of" the sciences (Bertalanffy 1965). For Bertalanffy (1968, pp. 90–1), who had contributed to the foundations of general systems theory since the 1930s, systems theory is a research paradigm (1968, pp. 90–1). Laszlo also called it "a perspective" (1975, p. 10).

4.3 Systems, Systems Theory, Cybersemiotics, and Cultural Semiotics

To approach semiotics from a systems theoretical perspective means to construct a bridge over the gulf that divides the natural sciences from the humanities (Brier 2015a). On biosemiotic grounds, the project of cybersemiotics has undertaken to construct such bridges in the study of cognition and communication. To bring systems theory within the scope of cultural semiotics has been a project of Nöth (1977) and W.A. Koch (1986), among others (Nöth 1990). The founder of general systems only contributed to cultural semiotics with an essay on the nature of the symbol (Bertalanffy 1965). Transdisciplinary bridges between systems theory and cultural semiotics can be found in Altmann and Koch's (1998) volume *Systems: New Paradigms for the Human Sciences*. The volume opens perspectives on systems in science, social organizations, ideologies, knowledge domains, cognition, culture, music, language, and literature. In this volume, Bunge wrote on "Semiotic systems", Koch on "Systems and the human sciences", Wildgen on "Chaos, fractals, and dissipative structures in language", Merrell on "Fractopoi, chaosmos, or merely simplicity-complicity", and S. J. Schmidt on "A systems-oriented approach to literary studies".

"System" is a notion that both brings together and separates systems theory and semiotics. In semiotics, the concept was central for the structuralists, not for Peirce (cf. Nöth 2018, p. 21). Whereas language was an *organism* in the nineteenth century evolutionary linguistic conception of Wilhelm von Humboldt, its interpretation changed with Ferdinand de Saussure to "a system in which everything holds together", as Meillet paraphrased Saussure's idea (cf. Koerner 1996). For the structuralist, the system of language is "tightly closed" ("serré"), homogeneous, "well-defined in the heterogeneous mass of speech facts". Language is not only "a complex mechanism", but a mechanism characterized by "over-complexity" (Saussure 1916, pp. 14–15, 73; cf. Sofia 2017). In its structure, Saussure's system is self-sufficient, insofar as it is conceived as entirely independent of any environmental factor. Even language change is "self-generated in the absence of certain external conditions" (1916, p. 150). The independence of the semiotic system from its environment became a structuralist dogma: "My definition of language presupposes the exclusion of everything that is outside its organism or system – in a word, of everything known as 'external'", declared Saussure (1916, p. 20). The Saussurean conception of the self-sufficiency of a system constitutes the major contrast between the structuralist and later systems theoretical concepts of the language system since Roman Jakobson (1959, p. 275). For Luhmann, system and environment constitute themselves mutually.

> Relationship to the environment is constitutive in system formation. It does not have merely 'accidental' significance, in comparison with the 'essence' of the system. Nor is the environment significant only for 'preserving' the system, for supplying energy and information. For the theory of self-referential systems, the environment is, rather, a presupposition for the system's identity, because identity is possible only by difference (Luhmann 1995b, pp. 176–177).

In semiotics, the neglect of the environment of semiotic systems only ended with Lotman's theory of the semiosphere as the environment of any semiotic system. It is the theory of an environment conceived as a semiotic space in which the "codes of a culture" are "immersed" and which constitutes a "cluster of semiotic spaces and their boundaries" (Lotman 1990, p. 123–125). For Lotman, such an environment is "necessary for the existence and functioning of languages", but its structure is not complementary to the semiotic system, as Uexküll's *Umwelt* is in relation to the "organism's inner world" (Uexküll 1940). Instead, it is a space of *otherness* that serves to confirm and strengthen the system's identity self-referentially within its own boundaries (cf. Nöth 2006, p. 260). While Luhmann adopts a post-Saussurean stance with respect to the concept of system, he remains somewhat closer to the structuralists in his use of the concept of difference. Luhmann's remarks about the function of differences in systems seem to echo Saussure's famous dictum that in the system of "language there are only differences" (1916, p. 120), although they are certainly no copy of it. Luhmann (1995b) writes:

> In a certain way, difference holds what is differentiated together; it is different and not indifferent. To the extent that differentiation is unified in a single principle (e.g., as hierarchy), one can determine the unity of the system from the way in which its differentiation is constituted. Differentiation provides the system with systematicity; besides its mere identity (difference from something else), it also acquires a second version of unity (difference from itself) (p. 18).

The idea of difference as the power that holds the system together differs sharply from the poststructuralist conception of difference as reflected in Eco's Deleuze-inspired reflections on "The sign as difference". Here, difference no longer constitutes the system, but is, to the contrary, a wound in the system's body. "The sign function exists by a dialectic of presence and absence, as a mutual exchange between two heterogeneities. Starting from this structural premise, one can dissolve the entire sign system into a net of fractures. The nature of the sign is to be found in the "wound" or "opening" or "divarication" which constitutes it and annuls it at the same time" (Eco 1984, p. 23). To refer to the sign system as a net of fractures instead of differences is certainly a poststructuralist perspective that overthrows the Saussurean dogma of the system in which differences hold everything together. It is equally incompatible with Luhmann's systems philosophy of difference as the structure constituting the system.

4.4 Information, Meaning, and Form

Cybersemiotics distances itself from the probabilistic concept of information adopted by information theory in the tradition of Shannon and Weaver (1949). It integrates, instead, within its core, Charles S. Peirce's semantic theory of information as outlined in Brier's *Cybernetics and Human Knowing* (Nöth 2012). The founder of cybersemiotics first formulated his own programmatic goal of restituting the semantic dimension inherent in the ordinary language concept information to the theoretical concept of information in the subtitle of his seminal book, *Cybersemiotics. Why Information Is Not Enough* (Brier 2008). Information is not enough because Shannon's mathematical theory of information is a theory of signals and not of signs conveying meanings, let alone meanings that convey new knowledge to its interpreters.

Brier's most comprehensive account of how information should be redefined on Peircean grounds is in his paper "Finding an information concept suited for a universal theory of information" of 2015. An appropriately revised approach to information should take into account "subjective experiential and meaningful cognition as well as intersubjective meaningful communication in nature, technology, society and life worlds", writes Brier (2015c, p. 622). In this context, Brier proposes that a theory of information on Peircean grounds could make progress by incorporating elements of Luhmann's systems theory. Indeed, Luhmann and Peirce do not only share a semantic concept of meaning but they also share "the idea of form as the essential component" of meaning (Brier 2015c, p. 631). Luhmann's concept of meaning has more affinities with Saussure's than with Peirce's semantics (Zeige 2015). Key notions in the context of his reflections on meaning are difference and form, form being a synonym of "structure" for the structuralists. With Saussure, Luhmann shares the premise that a theory of meaning needs to exclude the idea of an object of reference. The sign is a form within a closed system that has no window to allow any view of reality since the only reality it knows is the system's internal reality that the sign itself constructs through its form (Luhmann 1993, p. 50). With such definitions, both Saussure's and Luhmann's concepts of meaning connote an element of self-referentiality. Luhmann (1995a) acknowledges this characterization of his semantics explicitly:

> The problem of self-reference reappears in the form of meaning. Every intention of meaning is self-referential insofar as it also provides for its own reactualization by including itself in its own referential structure as one among many possibilities of further experience and action. At any time, meaning can gain actual reality only by reference to some other meaning; to this extent there is no point-for-point self-sufficiency and also no per se notum

> (i.e., no matter-of-factness). Ultimately, the general problem of self-reference is duplicated, to the extent that in the domain of the meaningful it becomes unproductive for meanings to circulate as mere self-referentiality or in short-circuited tautologies (p. 61).

Distinctions are drawn by interpreters, conceived as autopoietic systems, as "receivers" who "construct" the meaning "from the information produced by the interpretation of signs, within certain frames that reality imposes" (Brier 2015c, p. 630). For the constructivist, the form of meaning is a form imposed on the sign interpreter's mind by the sign system. For them, meaning, thus conceived, *is* "the form of the world".

> The form of the world […] consequently overlaps the difference between system and environment. Even the environment is given to them in the form of meaning, and their boundaries with the environment are boundaries constituted in meaning, thus referring within as well as without. […] The system's differentiation with the help of particular boundaries constituted in meaning articulates a world-encompassing referential nexus […]. But the boundary itself is conditioned by the system, so that the difference between the system and its environment […] is thematized in self-referential processes (Luhmann 1995b, pp. 61–62).

For Peirce, by contrast, it is the object of a sign that conveys meaning, neither its interpreter nor the sign system; and form is what this object conveys through the meaningful sign. In an early paper in which the object of the sign is simply a "thing", Peirce's ideas concerning the dichotomy of form and meaning are these:

> The meaning of a thing is what it conveys. Thus, when a child burns his finger at the candle, he has not only excited a disagreeable sensation, but has also learned a lesson in prudence. Now the mere matter cannot have given him this notion, since matter has no notions to give. […] What is the necessary condition to matter's conveying a notion? It is that it shall present a sensible and distinct form. It must obviously possess a form, since formless matter is chaos […] It is the form of a thing that carries its meaning (Peirce 1861, p. 50)

Hence, the form of nature is not intelligible because human minds organize it by means of their signs and sign systems. Nature is intelligible because it is itself rational insofar as its processes "are seen to be like processes of thought" ("The Critic of Arguments", CP 3.422, 1892; cf. Brier 2015b). The human mind can perceive the forms of nature because these forms have evolved under, and are determined by, the same evolutionary laws that have also determined the evolution of the objects of cognition. These forms carry a meaning of their own, irrespective of the meanings that different cultures may attribute to them. The significant form of the sign consists in its semiotic potential, its power to represent its object and thereby determine an interpretant to represent its signification and denotation. About the sign as a significant form, Peirce also says that "it is a type, or form, to which objects, both those that are externally existent and those which are imagined, may conform, but which none of them can exactly be" ("What Pragmatism is", CP 5.429, 1905).

4.5 Peircean Systems Theoretic and Cybersemiotic Perspectives on Signs

Peirce's general semiotics is not a theory of sign systems, even though some thoughts on the nature of systems can be found in his prolific writings (Herbenick 1970). It is rather a theory of "the general conditions of signs being signs [… and] of the laws of the evolution of thought" ("The Logic of Mathematics", CP 1.444, c.1896). Nevertheless, there are elements in Peirce's concept of a sign that evince affinities with the notion of system as defined in systems theory. Some parallels become apparent in a comparison of what Peirce says about the nature of a sign with what systems theoreticians say about the nature of systems. A sign is in one sense not a system but an element of a sign system, but the study of signs to which Peirce dedicates his method of pragmatism are mainly *concepts*. If we keep in mind that for Peirce, a diagram is "an Icon of intelligible relations" ("Prolegomena to an Apology for Pragmaticism", CP 4.532, 1906), it is not difficult to recognize that a concept in Peirce's definition is a system in Bertalanffy's definition. While the founder of general systems theory defines a system as "a set of elements standing in interrelation among themselves and with the environment" (Bertalanffy 1975, p. 159), Peirce defines a concept quite similarly as follows: "A concept is not a mere jumble of particulars, – that is only its crudest species. A concept is the living influence upon us of a diagram, or icon, with whose several parts are connected in thought an equal number of feelings or ideas" ("The Essence of Reasoning", CP 7.467, 1893).

A first cybernetic principle characteristic of signs according to Peirce's definitions is their agency by final causes. Peirce attributes agency by final causality both to living beings and to symbols (Santaella 1999). The purpose of a living system is to survive both individually and as a species. Maturana and Varela define this feature of life in terms of *teleonomy* as "the element of apparent purpose or possession of a project in the organization of living systems" (1980, p. 138). Teleonomy is thus a distinctive feature of autopoietic systems, "continuously revealed in the self-asserting capacity of living systems to maintain their identity through the active compensation of deformations" (Maturana and Varela 1980, p. 73). As conceived by Peirce, symbols are "living realities" ("The Law of Mind", CP 6.152, 1891). Their purpose is self-replication insofar as they aim at creating interpretants and thus determine future thoughts. "The whole purpose of a sign is that it shall be interpreted in another sign", says Peirce ("On Pragmatism", CP 8.191, 1904). Both symbols and biological systems pursue their goals without some precisely predetermined trajectory. This distinguishes the causality by which they operate from the efficient causality that operates in simple machines, where efficient causes determine a fixed trajectory admitting no other exception than the system's breakdown. As Peirce puts it, the laws of mind and of life "exhibit a striking contrast to all physical laws […]. A physical law is absolute, [… but] no exact conformity is required by the mental law" ("The Architecture of Theories", CP 6.23, 1891).

The second cybernetic principle characteristic of both signs and systems is the one of *self-control*. A cybernetic system has the capacity of self-control to the degree to which it maintains itself stable. For Peirce, self-control is also a characteristic of symbolic signs. This insight is not entirely new. Holmes (1966), Ransdell (1992), Queiroz and Loula (2011), and Antomarini (2017) have addressed some aspects of it. For the affinities between signs and living systems, see also Nöth (2014). In living systems, self-control manifests itself in the form of homeostasis. Homeostasis also occurs in processes of semiosis and in the evolution of semiotic systems in processes that counteract disturbances of the system (cf. Nöth 1977). For Peirce, self-control manifests itself in the purpose of symbols to "to bring truth to expression" ("The Grammatical Theory of Judgment and Inference", CP 2.444, c.1897). With this argument, Peirce expresses his conviction that, over the long term, the laws of inference are powerful enough to reveal distortions or falsifications and to bring truth out into the open. As Peirce put it, "though men may for a time persuade themselves that Caesar did not cross the Rubicon, and may contrive to render this belief universal for any number of generations, yet ultimately research – if it be persisted in – must bring back the contrary belief" ("Truth and Falsity and Error", CP 5.565, 1901). Under these premises, Ransdell describes the cybernetic nature of the agency of symbols according to Peirce as follows:

> All of this is reminiscent of the way in which even relatively simple cybernetic devices, such as thermostats and automatic pilots, continually tend toward a certain goal state in spite of the variations in the observational data which are fed into them, simply because they are so constructed as to move from whatever data they ingest towards the same end. This tendency is often called nowadays 'equifinality'. The parallel in Peirce's philosophy to the principles of construction of such self-control systems is to be found in his theory of inference, in which he correlates the hypothetical, deductive, and inductive types of inference into a unified total process, exemplifying continuous self-control and self-correction in such a way as to constitute an inherent tendency toward truth (Ransdell 1992, p. 171).

A scholar who has studied, with Peirce, cybernetic forms of self-control in other processes of semiosis is Larry Holmes. Extending the Peircean principle of self-correction in logic, the author also sees evidence of rational self-control in ethical conduct:

> The process is the same for logical reasoning as for moral. "No sooner have we drawn a conclusion, than we begin to turn upon it a critic's eye and to ask ourselves whether it really conformed to our logical ideals. […] Reasoning properly means controlled thought, and the only possible control consists in critical review, or self-confession" (MS 451, pp. 12-13). In cybernetic terminology, there is a corrective feedback, which tends, as the action is considered and repeated, to reduce the oscillations – one's violent wayward impulses" – and to bring the action closer to the ideal. There is also a similar process with respect to norms or ideals, until a stable one emerges; although Peirce appears to hold that in the overall development of reason no norm is entirely stable, which indeed seems consistent with an evolutionary pragmatism applied to a developing organism. As Norbert Wiener says, "The stable state of a living organism is to be dead" (Holmes 1966, p. 117).

4.6 How Autopoietic Systems Communicate

Brier (2006) proposes a cybersemiotic theory of communication integrating Peircean semiotics, autopoiesis theory, second-order cybernetics, and information science within a comprehensive model. The application of the theory of autopoiesis to the study of communication calls first for an answer to the fundamental question, Is communication possible between closed systems at all (cf. Nöth 2013a)? Luhmann himself recognized the problem and discussed it under the heading of "The improbability of communication" (1981). In *Autopoiesis and Cognition* (1980) Maturana and Varela inaugurated a new paradigm of communication in which organisms are defined as autopoietic (literally: 'self-creating') systems. They are autopoietic because they have the capacity of self-maintenance and of self-determined interaction with their environment (Varela 1979, 1981). A cell of any organism is an example. In the process of maintaining itself alive, it has the capacity of continuous self-renewal in a process in which it only fulfils functions made possible by its own structure. This capacity defines the cell's agency as self-referential (Maturana and Varela 1980). The opposite of an autopoietic system is an allopoietic (literally 'other-created') system. A motor vehicle operated by a driver is an allopoietic system since its output is determined by the driver's external input. In contrast to Bertalanffy, who described living systems as open, Maturana and Varela conceive it as essentially closed. "Every autonomous system is organizationally closed" (Varela 1979, p. 58).

How can two systems interact in communication if both are closed to each other? Systems theory has long since distanced itself from the naïve Shannon-Weaver model of communication as the flow of information from a source to a destination, optimizable as to its efficiency in attaining the goal of congruence between the sender's message and the receiver's interpretation (Laszlo 1972, p. 251). The theory of autopoietic systems proposes a radically different model (Köck 1980). "The view of communication as a situation in which the interacting systems specify each other's states through the transmission of information is either erroneous or misleading", declares Maturana (1978, p. 54). Instead, communication is a cognitive process of interaction between structurally coupled *autonomous* organisms:

> Autopoietic systems may interact with each other under conditions that result in structural (behavioral) coupling. In this coupling, the autopoietic conduct of an organism *A* becomes a source of deformation of an organism *B*, and the compensatory behavior of organism *B* acts, in turn, as a source of deformation of organism *A*, whose compensatory behavior acts again as a source of deformation of *B*, and so on recursively until the coupling is interrupted. In this manner, a chain of interlocked interactions develops. In each interaction, the conduct of each organism is constitutively independent in its generation of the conduct of the other, because it is internally determined by the structure of the behaving organism only; but it is for the other organism, while the chain lasts, a source of compensable deformations that can be described as meaningful in the context of the coupled behavior. *These are communicative interactions* (Varela 1979, p. 49).

A necessary prerequisite of communication, according to Maturana, is that "the domain of possible states of the emitter and the domain of possible states of the receiver must be homomorphic, so that each state of the emitter triggers a unique state in the receiver" (1978, p. 54). Only after "a behavioral homomorphism" has been established through processes of "ontogenic structural coupling" that create "consensual domains" (ibid.) can communication take place. Otherwise, "there is no behavioral homomorphism between the interacting organisms and, although individually they operate strictly as structure determined systems, everything that takes place through their interactions is novel and anti-communicative in the system that they constitute together, even if they otherwise participate in other consensual domains" (ibid.). Communication thus results in the expansion of consensual domains through autopoietic processes of self-generation and self-transformation. The autonomous mind of an organism develops through "an endless sequence of interactions with independent entities that select its changes of state but do not specify them" (Maturana and Varela 1980, p. 35). Congruence of the cognitive domains of emitter and receiver is not the goal of a communicative process, but consensus in consensual domains is the prerequisite of communication. Instead of information flow, there is a coupling of autopoietic systems, but these behave self-referentially.

The concept of system in Maturana and Varela's theory of communication is ambiguous. In some contexts, the system is the individual organism that communicates; in others, the couple of the addresser and the addressee constitute it. At any rate, not only the communicating organisms individually but also the system constituted by an addresser and an addressee form *semiotically closed systems* (Uexküll 1978, 1981; Köck 1980, p. 100). Varela's account of what happens within the system of a communicator *A* interacting with a communicate *B* is radically constructivist. The agent in a communicative process is not an individual addresser or addressee but the autopoietic system constituted as such through the very situation in which they communicate. In a communicative process, two autonomous systems are mutually "coupled" in a way that *A* cannot "inform" *B*. Hence, information is actually impossible in communication:

> If the coupled organisms are capable of plastic behavior that results in their respective structures becoming permanently modified through the communicative interactions, then their corresponding series of structural changes (which would arise in the context of their coupled deformations without loss of autopoiesis) will constitute two historically interlocked ontogenies that generate an interlocked consensual domain. […] Thus, communicative and linguistic interactions are intrinsically *not* informative: organism *A* does not and cannot determine the conduct of organism *B*, because due to the nature of autopoietic organization itself, every change that an organism undergoes is necessarily and unavoidably determined by its own organization (Varela 1979, p. 49).

The prototype of communication is dialogic exchange, conversation in the etymological sense of a "turning around together", acknowledges Maturana (1978, p. 55). However, there can be no dialogic "exchange" of information under the premise of the autopoietic closure of systems that allow only coupling. The systems theoretical scenario of communication between autopoietic systems that cannot exchange information has affinities with J. von Uexküll's *umweltlehre*, whose principal argument is similar: organisms live in a "self-centered" environment (Kull 2010, p. 348) that prevents them from knowing signs other than those that their species-specific constitution allows them to cognize. Thure von Uexküll (1981, p. 14) has argued that Jakob von Uexküll's (1940, p. 8) biosemiotic functional circle and even Wiener's cybernetic control systems include an element of autonomous closure: both biological and cybernetic systems can only react to their environment according to their inner needs, which are their system's desired states.

4.7 Luhmann's Radicalization of the Scenario of Self-Reference in Communication

Luhmann sides with the theory of communication as an autopoietic process when he adopts the argument that in communication there is no transfer of information but "a shared actualization of meaning" (1995b, p. 32). Meaning is merely actualized but not transmitted since communication presupposes an "underlying meaning structure" common to the addresser and addressee. Meaning is a necessary presupposition of communication since it forms the "shared background against which informative surprises may be articulated". Hence, communication can only have the effect of "reciprocal regulations of surprises" (ibid.; cf. Brier 2008, p. 239). Luhmann's argument cumulates in the thesis, "What we have in the case of communication, then, is not the transfer of things but the allotment of surprises" (1995b, p. 32). The polemic style of this formulation is apparent to anyone who knows that nobody has ever defined communication as a transfer of "things" except the professors of Jonathan Swift's Lagado, who wanted to substitute words for objects.

As provocative as the theories of closed systems that communicate without transferring any information may be, Niklas Luhmann's systems theoretical account of communication appears still more provocative when its author postulates that communication is, if not impossible, then at least improbable. Without denying that communication is the prerequisite of human life, Luhmann (1981) speaks of the "improbability of communication" and argues that communication never really happens because minds are self-referentially closed systems. "What another has perceived can neither be confirmed nor repudiated, neither questioned nor answered. It remains enclosed within consciousness and opaque for the communication system as well as for another consciousness" (Luhmann 1992, p. 253). Unlike letters or packages that can be sent from a sender to a receiver, thoughts and meanings cannot be transmitted because the sender's mind is a closed and therefore self-referential system.

Luhmann rejects the common-sense assumption that social action and human communication are due to "individuals or subjects to whom the action or communication can be attributed" (1992, p. 251). Not some individual, but "only communication can communicate" within a network of communication (1992, p. 251). Not only is each individual coupled in a communicative situation itself a closed system but the communication system that the communicating individuals constitute together is also a "completely closed system that creates the components out of which it arises through communication itself. In this sense, a communication system is an autopoietic system that (re)produces everything that functions as a unity for the system through the system itself" (Luhmann 1992, p. 254). Again, Luhmann likes to provoke. His argument of the impossibility of communication implies a paradox because, convinced of the impossibility of communication, Luhmann could hardly pretend that communicating his ideas to his readers could make any sense. It was Wittgenstein (1953) who recognized this paradox, when he argued: "But if you say: 'How am I to know what he means when I see nothing but the signs he gives?' then I say: 'How is he to know what he means, when he has nothing but the signs either?'" (p. 504).

4.8 Self-Referential Communication from the Peircean Perspective

It has been argued that Peirce was a philosopher of signs and not one of communication, but in fact, the founder of pragmatism had much to say about the nature of communication (Nöth 2013b). Peirce's semiotic theory of communication differs from the ones developed in information and systems theory, but not in all respects. For Peirce, information can neither be accounted for in terms of negentropy (Wiener) nor can it be conceived in terms of selection from a repertoire of possibilities (Luhmann). Instead, information is concerned with signification, denotation, and propositional knowledge (Nöth 2012). For Peirce, communication does not connect autopoietic systems constructing their own signs, meanings, and realities. The founder of pragmatism would have criticized this view as the error of considering "a mind as something that 'resides'" in a brain, "something within this person or that, belonging to him" ("Lecture on Pragmatism III", CP 5.128, 1903). Signs are not the intellectual property of those who replicate them. The real agents in communicative processes are living systems selecting information units from a repertoire of semantic possibilities (Luhmann 1992, p. 252). Organisms are perhaps coagents, but not the true agents in processes of semiosis. It is not the so-called sign producer that produces the meanings conveyed by the sign; it is the sign that carries and conveys it to an interpretant (Nöth 2009). A sign is not the products of a brain; it is only embodied and replicated there. In one of his definitions, Peirce says about the sign: "It is an element of cognition so embodied as to convey that cognition from the thought of the deliverer of the sign, in which that cognition was embodied, to the thought of the interpreter of the sign, in which that cognition is to be embodied" ("On the Logic of Quantity, and especially of Infinity", MS 16:12, c.1895).

The thoughts of a literary author, for example, are in some sense much more outside the brain in which they were conceived than they are located within it ("Psychognosy", CP 7.364, c.1902). The agents in a sign process are not even human subjects at all since by a sign process ("semiosis"), Peirce means "on the contrary, an action, or influence, which is, or involves, a coöperation of three subjects, such as a sign, its object, and its interpretant" ("A Survey of Pragmaticism", CP 5.484, c.1907). On the other hand, there are indeed elements in Peirce's theory of communication that do forebode or even anticipate elements of the systems theoretical communication theories reviewed above, even though in a somewhat different guise. Here, we can only examine three of them, (1) the conception of the dialogue as a system, (2) the argument of the impossibility of communication without a common background of collateral experience, and (3) the argument of the impossibility of communication between two minds because these are closed to each other.

(1) *Dialogue*. The conception of the dialogue as an autopoietic system that is more than the mere conjunction of two (or more) autonomous living systems is the following:

> Whenever we engage in social interactions that we label as dialogue or conversation, these constitute autonomous aggregates, which exhibit all the properties of other autonomous units. It is not easy to establish strict criteria for this view of conversations, for their closure is transient and mobile. However, this view is not more laden with difficulties than the predominant way of looking at it in terms of the performance and competence of single speakers (Varela 1979, p. 269).

Peirce's first counterpart to this notion of conversation as a system of its own is in his concept of the *commind* or *commens*, "that mind into which the minds of utterer and interpreter have to be fused in order that any communication should take place" ("Letter to Lady Welby", EP 2, p. 478). In the letter to Lady Welby of 1906, in which he introduced the notion, Peirce explains, "This mind […] consists of all that is, and must be, well understood between utterer and interpreter, at the outset, in order that the sign in question should fulfill its function. […] No object can be denoted unless it be put into relation to the object of the commens" (ibid.).

(2) *Collateral experience*. "Collateral experience" and "collateral observation", defined as the "previous acquaintance with what the sign denotes" ("Letter to William James", EP 2, p. 494; 1909), are the concepts by means of which Peirce describes the necessary prerequisite of knowledge that an addresser and an addressee need to share in order to communicate successfully. Maturana (1978) formulates the same concept more abstractly and radically. In his words, "the domain of possible states of the emitter and the domain of possible states of the receiver must be homomorphic, so that each state of the emitter triggers a unique state in the receiver" (p. 54). Luhmann's (1995b) corresponding notion is the one of communication as "a shared actualization of meaning" (p. 32). It expresses the idea that collateral knowledge, as the presupposition of successful communication, cannot be conveyed through the very process of communication of which it is itself a presupposition. Instead, knowledge of, and experience with, the object of the sign, the subject matter of communication, must precede its communication, wherefore this knowledge cannot be transmitted but only actualized. Peirce's way of expressing this idea is the following:

> A Sign may bring before the Mind, a new hypothesis, or a sentiment, a quality, a respect, a degree, a thing, an event, a law, etc. But it never can convey anything to a person who has not had direct experience, or at least original self-experience of the same Object, collateral experience. It cannot convey a notion of the color red to a color-blind person, nor of Shakespearian diction to a person who does not know […]. (Fragment of a letter to Lady Welby, MS, reel L6, microfilm 617, p. 14, first version, c.1908)

(3) *Impossibility of communication between mutually closed minds. The argument of autopoiesis* theory that communication is the interaction between mutually closed minds is reminiscent of the proverbial insight that we *cannot read* thoughts. Although his theory of communication is not one of communicating subjects but one of the agency of the sign and its effects on interpreters in the form of embodied interpretants, Peirce did write on the topic of the mutual inaccessibility of the minds of addressers and addressees of a message. In a still unpublished fragmentary passage of MS 318 of 1907, a manuscript that has been published only in part in EP2 under the title of "Pragmatism", Peirce formulates this paradoxical insight in the following description of a dialogue between an utterer an interpreter:

> But why should I particularly care who it may be that has uttered the sign that I am proposing to interpret? *Answer*: It is because the purpose of a sign is to supplement the ideas of the life of which I, the interpreter, am a part, – ideas which I have drawn directly from my own life, – with a copy of a scrap torn out of another's life or rather from his panorama of life, his general view of all life, and I need to know just where on my panorama of universal life I am to insert a recopy of this copied scrap. Here note well that no sign can ever fully direct its interpreter where upon his own panorama any copied scrap from another that contains that same sign ought to be attached and the reason is obvious. The utterer's sign can embody nothing but a bit of the utterer's idea of his own life (MS 318, "Prag.", Reel 7, microfilms no. 718–723, 1907).

The imaginary question brought before the pragmaticist's mind concerns the autonomy of the interpreter, the pragmaticist – let us call her or him P and the utterer U. Should P care about U's thoughts, which P cannot read anyhow? U is hardly mentioned any more in the answer. After all, the message is not about the sender's intentions, but about the purpose of the sign, which is only a fragment, a scrap, torn off from U's life panorama. But the ideas conveyed by the sign are not just "received" by P, as in the scenario of a receiver who receives a message transmitted by a sender. To the contrary, these ideas, scraps torn from U's life panorama, must be inserted within P's own life panorama to become meaningful, but within this panorama, they are nothing but fragments, too. This scenario of interpretation as the insertion of a copy within the interpreter's mental panorama is the one of an autopoietic interpreter who reconstructs a message self-referentially and anew within his or her own mind, as conceived in autopoiesis theory. What Peirce emphasizes in addition is that P's reconstruction of the ideas embodied in the sign are necessarily as fragmentary as the sign's embodiment of U's life is.

Peirce then goes on to discuss and interpret the rhetorical implications of the communicative scenario of the imaginary communication between U and P. "In attempting to give the interpreter to understand to what part of the interpreter's life it is to be attached, the utterer has several courses open to him, a real variety one should suppose. The problem before him will be to represent part of the interpreter's life" (ibid.). The argument that U, in order to convey signs embodying fragments from U's own life to P, needs to convey not fragments of U's own life, but anticipate signs embodying fragments of P's life, reads like a description of the rhetoric of communication as the coupling of two autopoietic systems. In order to establish a relation of coupling with P, U needs to imagine how U's fragmentary signs may be inserted within the mosaic of P's life panorama. Cognitively, however, U's attempt to anticipate ideas of P's life panorama is doomed to fail because P's mind is a closed system. "The utterer, has no ideas but his own ideas, lives no life but his own life. Let him try to specify a place on the interpreter's panorama, and he can only look over his own panorama, where he can find nothing but his own ideas", argues Peirce (ibid.). P's mind is closed within itself, and any attempt to transcend the boundaries of P's own panorama to reach U's mind can only refer back to the confines P's own mind. However, the mutual closure of U's and P's minds does not make communication impossible or unlikely. For U, the way out of the dilemma of the mutual closure of two minds that desire to communicate is to use his or her own panorama as the arena for staging the panorama that most likely represents P's life. Such an imaginary scenario is not doomed to failure because the assumption is plausible that two minds work similarly. The operations of semiosis in one is to a certain degree an icon of the operations in the other. Thus,

> on that panorama, he [i.e., the utterer] has, however, no difficulty in finding the interpreter's life, that is to say, his idea of it, and among the interpreter's ideas, that is, his own idea of the interpreter's ideas, he finds an idea of that part of the interpreter's panorama to which he conceives this scrap should be attached and this he expresses in his sign for the interpreter's benefit. The latter has to go through a similar round-about process to find a place in his own life that seems to correspond with his idea of the utterer's idea of his idea of his life and with all these changes of costume there is such imminent danger of mistake that the utterer would have done far better to express his own idea as well as he could convey it to the interpreter and allow the latter to find the place in his own life as he thinks of it. (ibid.)

Communication in this sense does have a touch of self-referentiality, if it is not even solipsism, because the dialogue of an utterer with an interpreter involves ultimately, if not two monologues, then at least the coupling of two inner dialogues. As such, communication has a characteristic of thinking in general. Thinking, too, "always proceeds in the form of a dialogue – a dialogue between different phases of the *ego*" ("Phaneroscopy", CP 4.6, 1906). Communication, under such premises, should be possible.

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Chapter 5
Transdisciplinary Realism

Basarab Nicolescu

Abstract The transdisciplinary approach, with its unique way of combining ontology, logic and epistemology, could inject much fertility into semiotics, social science, the second-order cybernetics and system science. I explain why the metaphysics of transdisciplinarity, radical distinctive from social constructivism, is the most beneficial for the development of second-order cybernetics. I will also compare the continuous interconnectedness of transdisciplinary Reality with Peirce's synechism. The Hidden Third, in its relationship with the levels of Reality, is fundamental for the understanding of *unus mundus* described by synechism. Transdisciplinary realism gives a solid foundation to the theory of synechism and could open new avenues of research in social science, the second-order cybernetics and system science.

Keywords Transdisciplinarity · Natural information · Spiritual information · Levels of reality · Hidden Third · Peirce · Synechism

5.1 Introduction

Semiotics, social science, the second-order cybernetics and system science are attempts at transdisciplinarity, but they largely tend to ignore basic notions of transdisciplinarity as the included middle and the Hidden Third. In fact, they lack the crucial connection between Subject and Object. The transdisciplinary approach, with its unique way of combining ontology, logic and epistemology, could therefore inject much fertility into these fields. I will explain why the metaphysics of transdisciplinarity, radical distinctive from social constructivism, is the most beneficial for

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the development of second-order cybernetics. I will also compare the continuous interconnectedness of transdisciplinary Reality with Peirce's synechism.

5.2 Methodology of Transdisciplinarity

The key concept of the transdisciplinary approach to Nature and knowledge is the concept of *levels of Reality*. By "Reality" I designate that which *resists* our experiences, representations, descriptions, images, or even mathematical formulations. Of course, one has to distinguish the words "Real" and "Reality". *Real* designates that which *is*, while *Reality* is connected to resistance in our human experience. The "Real" is, by definition, veiled forever, while "Reality" is accessible to our knowledge. By "level of Reality", I designate a set of systems which are invariant under certain general laws (in the case of natural systems) and under certain general rules and norms (in the case of social systems). That is to say that two levels of Reality are different if, while passing from one to the other, there is a *break in the applicable laws, rules or norms* and a *break in fundamental concepts* (like, for example, causality). Therefore there is a *discontinuity* in the structure of levels of Reality.

Every level is characterized by its *incompleteness*: the laws governing this level are just a part of the totality of laws governing all levels. And even the totality of laws does not exhaust the entire Reality: we have also to consider the Subject and its interaction with the Object. The zone between two different levels and beyond all levels is a *zone of non-resistance* to our experiences, representations, descriptions, images, and mathematical formulations. Quite simply, the transparence of this zone is due to the limitations of our bodies and of our sense organs, limitations which apply regardless of what measuring tools are used to extend these organs. The unity of levels of Reality and its complementary zone of non-resistance constitutes what I call the *transdisciplinary Object* (see Fig. 5.1).

Inspired by the phenomenology of Edmund Husserl, I assert that the different *levels of Reality of the Object* are accessible to our knowledge thanks to the *different levels of Reality of the Subject* which are potentially present in our being. As in the case of levels of Reality of the Object, the coherence of levels of Reality of the Subject presupposes a zone of non-resistance. The unity of levels of Reality of the Subject and this complementary zone of non-resistance constitutes what I call the *transdisciplinary Subject*. The zone of non-resistance plays the role of a *third* between the Subject and the Object, an Interaction term, which allows the unification of the transdisciplinary Subject and the transdisciplinary Object while preserving their difference. In the following I will call this Interaction term the *Hidden Third*.

The incompleteness of the general laws governing a given level of Reality signifies that, at a given moment of time, one necessarily discovers contradictions in the theory describing the respective level: one has to assert A and non-A at the same time. It is the included middle logic which allows us to jump from one level of Reality to another level of Reality. The basic ternary structure (A, non-A and T) shown in Fig. 5.2 indicates that the relation between different levels of Reality is

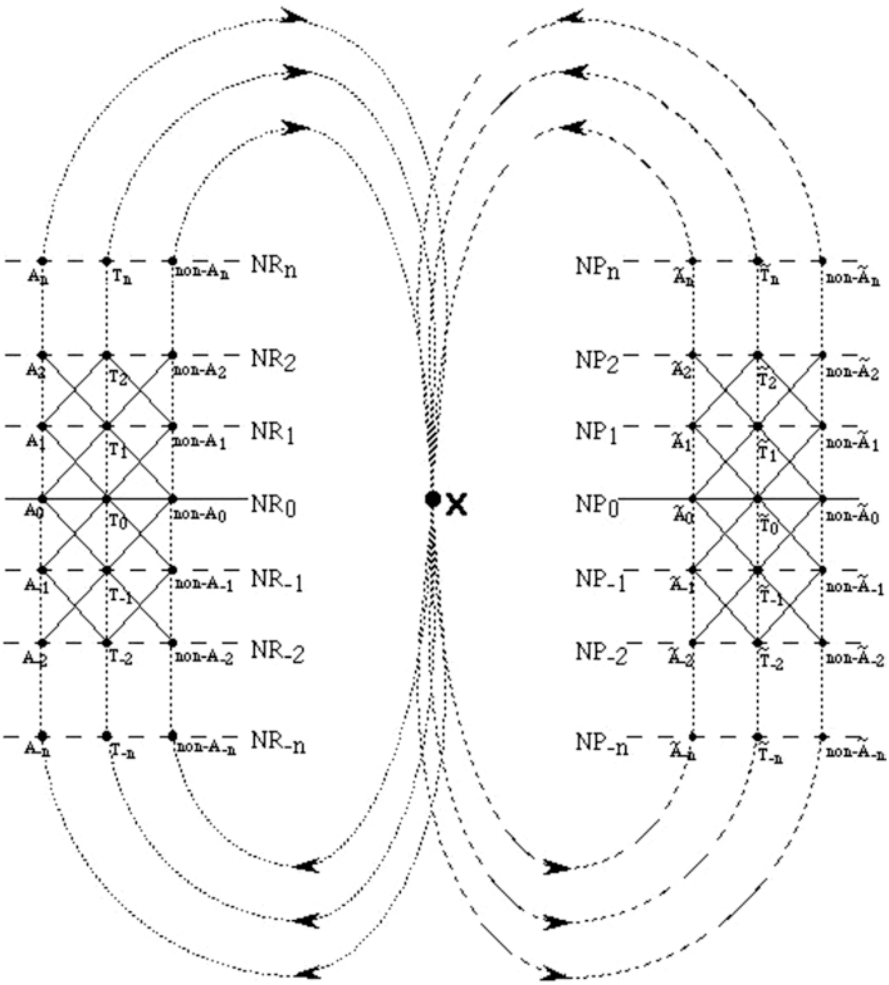

Fig. 5.1 The transdisciplinary Object, the transdisciplinary Subject and the Hidden Third

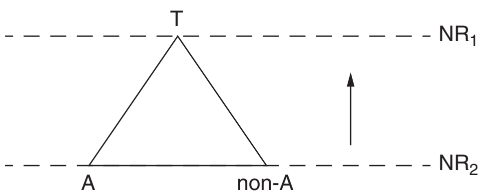

Fig. 5.2 Symbolic representation of the action of the included middle logic

realized through the included middle logic. Our understanding of the axiom of the included middle –there exists a third term T which is ate the same time A and non-A- is completely clarified once the notion of the “Levels of Reality” is introduced. If one remains at a single level of Reality, all manifestation appears as a struggle between two contradictory elements (example: we have A and corpuscle non-A). The third dynamic, that of the T-state, is exercised at another level of Reality, where that which appears to be disunited (wave or corpuscle) is in fact united (quanton) and that which appears contradictory is perceived as non-contradictory. In the projection of the T-state onto the same single level of Reality which produces the appearance of mutually exclusive, antagonistic pairs (A and non-A). A single level of Reality can only create antagonistic oppositions. It is inherently self-destructive if it is completely separated from all the other levels of Reality.

Till now, social science, the second-order cybernetics and system science are based upon the classical realism. Of course, second-order cybernetics introduces an observer. But *an observer is not a Subject*. An observer is, in fact, just another Object or cybernetic process which analyses a system, like an instrument of measure. The metamorphosis of the observer into a Subject occurs only if the Hidden Third is present. Moreover, social constructivism goes into a dead end because it eliminates the concept of *truth*, which is basic for defining science. If nothing is ontological, what kind of science we are speaking about? As remedy, social science and second-order cybernetics tried to introduce transdisciplinarity but in fact they consider only *transversality*, which is not transdisciplinarity. Transversality crosses several levels of organization but it remains inside just one level of Reality.

5.3 The Hidden Third and Peirce's Synechism

The transdisciplinary Object and its levels of Reality, the transdisciplinary Subject and its levels of Reality and the Hidden Third define the *transdisciplinary realism*, which is fully exposed in Fig. 5.1 (Nicolescu 2002). On the left of the figure we show the Object with its levels NR. On the right of the figure we show the Subject with its levels of perception NP. The logic of the included middle is capable of describing the coherence among these levels of Reality by iterative process defined by the following stages: (1) A pair of contradictories (A0, non-A0) situated at a certain level of Reality is unified by a T1-state situated at a contiguous level of Reality; (2) In turn, this T1-state is linked to a couple of contradictories (A1, non-A1) situated at its own level; (3) The pair of contradictories (A1, non-A1) is, in turn, unified by a T2-state situated at a third level of Reality, immediately contiguous to that where the ternary (A1, non-A1, T1) is found. The iterative process continues to indefinitely until all the levels of Reality, known or conceivable, are exhausted. In other words, the action of the logic of the included middle on the different levels of Reality induces an open structure of the unity of levels of Reality.

There is certainly a coherence of the unity of levels of Reality, as shown by the scientific connection between the infinitely small and the infinitely large scales, but this coherence is oriented in a certain direction: there is an arrow associated with all transmission of information from one level to the other. The coherence of the unity of levels of Reality is described by the Hidden Third which has a complex structure: three coherence loops of the ∞ shape crossing all levels of Reality. At a first glance, transdisciplinary realism, involving discontinuous levels of Reality, looks in contradiction with Peirce's synechism. We recall what "synechism" means:

> Synechism, as a metaphysical theory, is the view that the universe exists as a continuous whole of all of its parts, with no part being fully separate, determined or determinate, and continues to increase in complexity and connectedness through semiosis and the operation of an irreducible and ubiquitous power of relational generality to mediate and unify substrates. As a research program, synechism is a scientific maxim to seek continuities where discontinuities are thought to be permanent and to seek semiotic relations where only dyadic relations are thought to exist (Esposito 2016).

However, this idea of contradiction is a wrong conclusion. Naively, one could think that discontinuity involves separateness. But 'discontinuity' does not mean 'disconnected'. All levels of Reality are interconnected through the Hidden Third (Nicolescu 2015). In the framework of transdisciplinary realism, the universe is conceived as a vast whole, as a vast cosmic matrix in which everything is in perpetual motion and energetically structuring. But this unity is not static; it implies differentiation, diversity, the emergence of hierarchical levels, and the occurrence of relatively independent systems**,** of objects as local configurations. The different systems are combinations of elements that are in an interaction that can never be reduced to zero: the lack of interaction means the death, the disappearance of a system, its decomposition into constituents through loss of information.

The very existence of the Hidden Third means that the complex system is not just the sum of its parts and also that systems build systems of systems covering the full diversity of the world in a vast and ceaseless nonseparability, a real rescue for the existence of the systems. Nonseparability of complex systems involves a new type of causality, which we might call global causality, not in the sense of some external cause, but in the sense of the whole of the system being involved in constituting its properties. Discontinuity and nonseparability are intimately related. In other words, the Hidden Third restores the continuous interconnectedness of Reality. The zone of non-resistance of the Hidden Third penetrates and crosses the levels of Reality. Let us now compare this continuous interconnectedness of Reality with synechism.

It is clear, from the above considerations, that synechism is not in contradiction with transdisciplinary realism. However, some ambiguities related with the work of Peirce need to be clarified. Of course, the Hidden Third, as well as the notions of resistance and non-resistance, are not present in the philosophy of Peirce. This might explain why Peirce spent 20 years in trying to build his synechistic cosmology. He certainly felt a major obstacle in describing the interconnectedness of Reality in a rational way. The permanent change and evolution in Reality looked incompatible with the rationality of continuous laws. The key of the problem is that the discontinuous break in laws coexist with the continuity of just one law – the law of the laws – that of the action of the Hidden Third.

Another problem is the mathematical or non-mathematical description of continuity. In spite of the fact that Peirce spent a lot of time to describe continuity in a mathematical way, his depth of thinking on synechism went, in fact, well beyond mathematics (Peirce 1958). The permanent "increase in complexity and connectedness" of the universe cannot be described in a mathematical way. We cannot deal with a complex world in its all complexity. Every act of understanding involves a reduction of the complexity in order to be able to say something at all. This reduction inevitably has to leave certain aspects of the complex reality out of consideration. It is not possible to find a frame which would include the whole. This is precisely what is meant by the Hidden Third. There will always be some excess which cannot be reduced to the rationality provided by the frame. The Hidden Third is rational, but is not rationalizable.

Peirce clearly asserts that synechism is the view that to exist in some respect (A) is also to not exist (non-A) in that respect (CP 7.570). He therefore understood the necessity to go beyond the excluded middle logic: "the principle of excluded middle only applies to an individual" (CP 6.168), in other words to a system belonging to a given level of Reality. As soon as we go from one level of Reality to another level of Reality we confront the breaking of laws. As Peirce himself asserts, the principle of excluded middle "does not hold for anything general, because the general is partially indeterminate…" (CP 1.434). This is in complete agreement with transdisciplinary realism, based on the included middle logic.

It is understandable why the Hidden Third is the one that gives meaning to the included middle (or "included third"), because, in order to unite the contradictories A and non-A, located in the area of resistance, it must cross the area of nonresistance. Therefore, there is an intimate relationship between the included middle and the Hidden Third. However, there is a big difference between the Hidden Third and the included middle: *the Hidden Third is a-logical*, because it is entirely located in the zone of non-resistance, while t*he included middle is logical*, because it refers to the contradictories A and non-A, located in the zone of resistance. But there is also one similarity. Both of them unite contradictory notions: A and non-A in the case of the included middle, and Subject and Object in the case of the Hidden Third. Both the included middle and the Hidden Third capture the tension existing in and between the complex systems.

Peirce had the genial intuition that synechism and the category of Thirdness are related: "Continuity represents Thirdness almost to perfection" (CP 1.337). Thirdness, as an undecomposable element of the universe, is intimately connected with synechism. It is the category of mediation, regularity, and coordination, as well as of "generality, infinity, continuity, diffusion, growth, and intelligence" (CP 1.340). Thirdness in the transdisciplinary realism is fully exposed in Fig. 5.2 as the ternary ontological structure {levels of Reality of the Object, levels of Reality of the Subject, the Hidden Third}. Another facet of the Thirdness in Fig. 5.2 is the ternary included middle structure {A, non-A, T}. In fact, the Hidden Third is the supreme manifestation of Thirdness, i. e. Thirdness acting in the whole interconnected universe.

5.4 Conclusion

The Hidden Third, in its relationship with the levels of Reality, is fundamental for the understanding of *unus mundus* described by synechism. Transdisciplinary realism gives a solid foundation to the theory of synechism and could open new avenues of research in social science, the second-order cybernetics and system science.

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Chapter 6
Practice as Research: A Cybersemiotic Overview of Knowing

Paul Cobley

Abstract The rise of science in the last 400 years, in the academy and in socio-economic life in the West, has culminated in a crisis in the human endeavor of 'knowing'. Western policy makers have promoted the upgrading and uptake of science in the name of short-term economic goals by way of downgrading forms of 'knowing' that do not demonstrate immediate applicability to problems inherent in capitalism (Cobley P, Am J Semiotics, 30(3–4):205–228, 2014). Thus, pursuits such as those associated with the arts and humanities have been marginalized for their supposed failure to conform to standards of applicable knowledge, while mathematics and other 'theoretical' disciplines are increasingly yoked to the demands of producing new technologies. Partly in response to this crisis, the last two decades has seen the growth of a considerable amount of theorizing and a vibrant field concerned with 'practice as research' (PaR) or 'practice-led research'. This field treats artistic practices as forms of 'knowing' which can complement, supplement, enrich and provide alternatives to scientific 'knowing' without being subordinate to it. Arising from early observations on reflective practice (Schön DA, The reflective practitioner: how professionals think in action. Basic Books, New York, 1984; Kemmis S, 'Action research and the politics of reflection' In: Boud DR. et al. (eds) Reflection: turning experience into learning. Falmer Press, Falmer: pp 139–163, 1985; Boud DR, et al. (eds) Reflection: turning experience into learning. Falmer Press, Falmer, 1985), work on PaR and practice-led research, has gone some way to establishing a more explicit understanding of practice in the arts and elsewhere as fixtures in the academy, through, for example, validating practice-based PhDs.

To a great extent, the work in this area during the last 20 years – in relation to practice in general (Schatzki K-C, von Savigny E (Eds.) The practice turn in contemporary theory. London: Routledge, 2001; Borgdorff H, In Dutch J Music Ther, 12(1):1–17 (originally published in 2006 in the Sensuous Knowledge series, 02 [Bergen: Bergen National Academy of the Arts]), 2007; Smith H, Dean RT (eds) Practice-led research, research-led practice in the creative arts. Edinburgh University Press, Edinburgh, 2009a; Barrett E, Bolt B (eds) Practice as research: Approaches

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to creative arts enquiry. I. B. Tauris, London/New York, 2007) and in relation to specific practices such as creative writing, performance, dance, experiment, community arts, etc. – exemplifies a philosophy of knowing. Yet, in doing so, this work struggles with various theoretical perspectives that have usually arisen out of traditional conceptions of disciplinary boundaries. Possibly the most sympathetic philosophy of knowing in relation to the cause of PaR and practice-led research – a perspective that is absent from the literature on the topic - is offered by cybersemiotics (Brier S, Cybersemiotics: Why information is not enough!. University of Toronto Press, Toronto/London, 2008; Brier S, Entropy 12: 1902–1920. https://doi.org/10.3390/e12081902, 2010). As cybersemiotics has long contended, the emphasis on knowing as an 'engineering problem', addressing a "syntactic-structural aspect in cognition, thought, and communication", has led to "a decreased interest in the cultural-societal and historical dimensions of the meaning of human cognition and communication" rendering "the social sciences, humanities, and arts much less important in finding the processes of the construction of meaning than most researchers within these domains themselves believe" (Brier S, Cybersemiotics: Why information is not enough!. University of Toronto Press, Toronto/London, 2008, p. 56–57). Cybersemiotics proposes a thorough *transdisciplinary* approach to this problem, comprising a marriage of evolutionary perspectives on cognition and biology with a formulation on self-referring autopoietic observership derived from semiotics and second-order cybernetics. This paper introduces a cybersemiotic perspective on the capacity of arts and other practice for knowing, suggesting pathways for developing PaR and practice-led research, as well as reviewing the literature of this new configuration in cybersemiotic terms.

Keywords Practice-as-research · Semiotics · Cultural studies · Knowing · *Umwelt*

6.1 Introduction

In the last 400 years or so, the rise of the natural sciences in Western culture has resulted in them setting the benchmark for what knowledge should consist of and how it should proceed. Physics, in particular, has offered a dominant role model. It has established the standard for determining what is material in the universe as well as how materiality might be measured. Yet, in the face of this apparent hegemony of knowledge, there has been a curious development, both in the academy and in the general sphere of human investigation. In some countries and in some education systems, it is now possible to gain a PhD 'by artistic practice' – that is, by submitting a portfolio of art works (fine art, music, film, dance or other performing arts, creative writing) in which the main element is the artistic work – rather than any conventional written account of it - that has been carried out. Furthermore, in those countries where the research conducted by incumbent professionals of Higher Education and other knowledge-producing institutions is subject to audit, works of art of any kind may be offered for assessment as exemplars of research endeavor.

Given the prominence of the natural sciences in contemporary industrialized society, it is unsurprising that the environment in which artistic practice is identified as research is fraught. There remain pockets of criticism leveled at the idea that practice can be considered as equivalent, in its own knowledge production, to scientific procedures (see, for example, Elkins 2014a). Indeed, the instituting of measures for assessing practice as research has taken decades of struggle. Aside from its acceptance by institutions, the promulgation of the very idea of practice exemplifying research has required strenuous discussion, with the most sympathetic parties unable to decide what it should be called, what its priorities are, whether it overturns natural sciences' procedures or whether it should work within the procedural parameters set by the natural sciences. Nevertheless, what is clear is that there has been widespread acceptance, within sometimes hostile intellectual and educational policy arenas, that practice – and arts practice in particular – constitutes a kind of 'knowing' of the world. That is, there has been an understanding that practice can furnish individuals and social formations with new knowledge and original insights.

This initially fragile consensus did not arise out of nowhere and is by no means fully evolved. In what follows, some of its development will be discussed, including why its theoretical co-ordinates are so intimately related to cybersemiotics. Most importantly for the moment, it should be noted that,

(a) the idea of practice as (potentially) constituting research arises from a formation of intellectual forces that also forged cybersemiotics;
(b) cybersemiotics amounts to a potential unifying perspective on, or even a manifesto for, arts/practice research; and,
(c) in seeming contradiction of a), the intellectual reference points that underpin much of the rationale for, and assessment of, practice as research in many countries are very different to those of cybersemiotics.

The jumbled – or, to put it more academically, *overdetermined* – theoretical development of these issues in research has had its consequences. Where practical fixes have needed to be found quickly and unified perspectives have been eschewed, either as too time-consuming or ideologically undesirable, it has meant that some problematic areas in conceiving practice as research have remained. It will be argued, then, that not only did cybersemiotics' ethos contribute to the vision of practice as research, but cybersemiotics also offers the unified perspective that is lacking in the relatively fragmented approaches by which scholars have tried to implement the assessment of practice. Furthermore, and importantly, cybersemiotics reveals new angles on some of the more specific challenges of elucidating practice's knowledge potential. In particular, the aim in what follows is to provide an introduction to the idea of practice as research and an introduction to how cybersemiotics bears upon it. Yet, in addition, this essay will argue that, somewhat surprisingly, much of the literature on the research value of practice has undertheorized the concept of 'knowing'. The very character of what is entailed in research, it will be suggested, has tended to fall by the wayside amidst the environment of struggle in which the attempt has been made to assess and define practice. In order to understand these points, some words should first be offered on what practice as research has been understood to be (and how it continues to be understood) and how this stage has been reached.

6.2 PaR – where it Came from and Giving it a Name

There can be little doubt that working with the idea of practice as research amounts to operating in an emergent and contested field. One indicator of this is that there is still no accepted term to denote this enterprise. Among the main field-defining texts, there is one collection of original articles which is titled with reference to "research in the arts" (Biggs and Karlsson 2011), while another one contains both "practice-led research" as well as "research-led practice" in its name (Smith and Dean 2009a). Haseman and Mafe (2009, p. 212), like Sullivan (2009), favor 'practice-led research', but they note synonymous designations "including creative practice as research, practice-based research, studio research and performance as research" (cf. Smith and Dean 2009b, p. 2). Haseman (2006) also refers to "performative research", whose complications will be revisited below and is not to be confused with "performance-as-research" (Midgelow 2019). Liamputtong and Rumbold (2008) are concerned with arts-based and collaborative research methods, while Leavy (2009), an advocate of qualitative research in general, refers simply to "arts research". One project involving a research centre for ethnography of artistic practitioners refers to "artist-led research" (Johannson 2017). Borgdorff (2007), in an essay that is probably one of the clearest regarding these matters of definition and is available in a number of places on the World Wide Web, notes the various expressions used in the literature to denote artistic research. Ultimately, because of its intertwinement of research and practice, Borgdorff opts for 'practice as research', along with Barrett and Bolt (2007), Nelson (2013), May (2015), Scott (2016), Midgelow (2019) and others. For reasons that will hopefully become clear in what follows, 'practice as research' (or 'practice-as-research' or PaR) will be used here.

One issue that is beyond dispute is that PaR has arisen as a cause for debate at a particular time and in particular circumstances. That is no coincidence. In terms of publications in English discussing PaR, they are most densely concentrated in the first decade of the twenty-first century. One reason for the relatively smaller amount of publications in the following decade is that teachers and researchers have been busy implementing the principles discussed in such publications whilst demand for PaR PhDs increased and auditing of PaR by agencies quasi-autonomous of Western governments proliferated. The inspirations for this burgeoning debate were numerous intellectual and policy developments. Published reflections on the value of practice were already growing in number, the most notable of these being the influential volume by Donald A. Schön (1984) which, in fact, does not focus on artistic practice. In addition, especially from the 1980s onwards, qualitative methodology became increasingly widespread in a range of subject areas across the Western academy: not just in the social sciences (which also continued to rely on quantitative methods, too), but also in the humanities and the arts. In communications and media studies, qualitative method became *de rigeur* (Cobley 1994); likewise in cultural studies, which used oral history methods as well as other forms of qualitative enquiry such as focus group interviewing. Although such method for the arts did not become the fixture that it was in parts of the humanities, it nevertheless made significant in-roads where artistic practice was being incorporated into the academy (see, for example, Leavy 2015). For while reflection on both practice and method was taking place, the landscape of Western knowledge was also shaping and responding to it through economic and social policy as well as socio-economic developments.

What strongly determined the evolution of PaR was a series of changes in the educational policy landscape. Much of the theoretical and practical discussion of PaR was carried out in UK and Australian Higher Education, as well as in specific countries in Europe (for example, in Sweden – see Kälvemark 2011 – and France - see Allegue and Miereanu 2009). The United States' educational system has had a different history and approach in respect of how it has dealt with PhD topics; this, arguably, has not forced it into the same kind of struggle for PaR discussed here. What the United States had also earlier experienced, however, was the massification of Higher Education, a phenomenon that, as a global whole, only started to take hold as student numbers in Europe grew hugely. As part of this growth, European institutions underwent mergers and incorporation. One feature of my own career during this period involved teaching a UK equivalent of liberal arts in a Polytechnic which then gained university status in 1992 and incorporated a noted art school and a respected college of furniture and music technology. In order to be administered, let alone assessed, the different components of this higher education institution had to find some measure of equivalence across subject areas. In some ways, this was assisted by the introduction of a government-run assessment of research in universities. Pioneering in this process, from 1986 onwards, the UK government set up the Research Assessment Exercise to audit the research endeavor in institutions of Higher Education. This enabled or coerced – depending on how one views the matter – practitioners and artists to offer their work to be assessed on equivalent terms as 'traditional' research (that is, verbal reports of experiments and investigations in the sciences or theoretical/empirical enquiries in the social sciences and humanities). A further drive for equivalence came from the Bologna Process in the European Higher Education Area after its launch in 1999; this is an ongoing attempt to foster alignment of Higher Education offerings (such as courses and the terms of assessments, standards, length of degree programmes) across European countries. Meanwhile, practice was becoming increasingly central to the 'employability' of graduates in the labour market as the 'creative industries' (theatre, film, dance, art galleries, museums, and many more, at all levels of functioning) increased in size as job recruiters and contributors to the Western economy (see Kälvemark 2011, p. 10–12).

For many working in and around practice in education and research, these policy and social developments dovetailed, either nicely or problematically, with a number of 'turns' which had become fashionable in the grouping together of academic writings and educational approaches. Among these were the 'linguistic turn' (Rorty 1967), the 'ethnographic turn' (Culyba et al. 2004), the 'affective turn' (Wulff 2007) and, of course, the 'practice turn' (Schön 1984; Boud et al. 1985; Schatzki, Knorr-Cetina and von Savigny 2001). The 'cognitive turn' (May 2015), by contrast, has garnered, as will be noted, relatively little interest in this sphere, apart from the adoption of general, vague principles of 'embodiment'.

Two currents of thought, infrequently named as 'turns', provided an often unspoken inspiration for PaR. The first was the rise of Cultural Studies, which balanced a critical perspective with a more 'culturalist' one (Curran et al. 1982, p. 26–28; Bennett 1986, p. xii-xiv, xviii; Turner 1990, p. 30–32) in which, potentially, *all* cultural practices could be taken as objects of study that would expose their ideological, knowledge-bearing or affective dimensions. The second was 'postmodernism', a current of thought that was recognized in artistic and social circles as well as educational ones. Along with its academic twin sibling, 'poststructuralism', postmodernism cast doubt not only on the absolute primacy of particular practices over others, but also on the legitimacy and persuasiveness of many 'discourses' – in art, law, identities, politics, religion – that attempt to perpetuate hierarchies, power and control. In *The Postmodern Condition* (1984) Jean-Francois Lyotard reported that there was now widespread skepticism towards those "metanarratives" (sometimes called "grand narratives") such as Marxism and capitalism in politics, Christianity in religion, and so forth, that promised a defined, future conclusion for Western society. In the face of such perceived failure of the big narratives, it was clear that there was a renewed interest in smaller narratives and practices, both socially and artistically.

Arguably, the key impetus that PaR takes from postmodernism and Cultural Studies was offered already, prior to both of them, by semiotics. As a study that could extend to *all* signs, semiotics effectively leveled the 'playing field' of thought and practice. It effectively de-valorized *all* cultural artifacts while opening up avenues for interrogating the vicissitudes of signs, without undue biases, across the entirety of known existence. The concept of the 'text', invented concurrently by Roland Barthes (1977) and Juri Lotman (1974) in the early 1960s (Marrone 2014), indicated not a hierarchy of 'high' and 'low' culture but a fabric of devices, usually designed through habitual sign use, which would reach a particular audience. The 'linguistic turn', inaugurated by Richard Rorty's 1967 influential collection, seemed to complement semiotics, and certainly poststructuralism and postmodernism, in suggesting that the world is 'constructed in discourse' with humans' apprehension amounting to a mere figment induced by figures in language. As Robin Nelson (2013) puts it in the context of PaR, "Emphasizing the plurality of cultures and perspectives and social constructionism, [postmodernism] rejects essentialist accounts of identity, suggesting that not only is 'reality' constructed in discourse but the very identities of the subjects inhabiting it are mutable" (p. 54).

With pluralism entailing that more and more smaller practices gained attention, some started to abandon semiotics for fear that it amounted to a grand narrative even as it had moved some considerable distance from the idea of the world 'constructed in discourse'. The larger, more generalized perspective that semiotics exemplified, therefore, did not feed into PaR, although the relativism entailed by some variants of postmodernism, plus the idea of construction, did. Certainly, the integrated perspective represented by cybersemiotics would be likely to be resisted by those partaking of the former tradition, even while cybersemiotics was a facilitating voice in the struggle to recognize different kinds of knowing.

6.3 Knowing in PaR: Materiality, First Person, Reflexivity

The central idea of PaR is that artistic practice can constitute a form of knowing that is as crucial to humans' apprehension of the world as the grand narrative of science has been. Nevertheless, the nature of the knowing in PaR remains a topic for dispute even while debates about it have faded and universities have forged ahead with PaR PhDs and assessments of artistic research. The first point that is obvious is that there is a distinction involved in the use of the terms 'knowledge' and 'knowing'. 'Knowledge' is often used by research councils or awards bodies, as well as university PhD criteria, in outlining the requirements of PaR: that it 'contribute to knowledge' or present 'new knowledge'. As a noun, 'knowledge' here suggests a definitive outcome, an object that consists of an easily discernible result. Clearly, such a view of knowledge is consonant with traditional scientific research and its mode of presentation. Knowledge as presented in traditional research involves a rationale for the study, a literature review, a discussion of methodology, a layout of the data, an analysis of the data, a conclusion on the results and suggestions for further research. The process is not unimportant; but the product is crucial. Furthermore, the product is all the more acceptable if it can be quantified in some way.

The second point about 'knowledge' is that, even as a constituent of the product, it is not necessarily helpful or a 'good' in itself. In one of the most well-known formulations of this argument, Nicholas Maxwell (2014) has shown that knowledge-inquiry, or the much-vaunted 'knowledge for its own sake', has become "an intellectual and humanitarian disaster" (p. 20). As he demonstrates (Maxwell 2007, 2004, 2014), the development of the natural sciences and then the social sciences, from the late eighteenth century and nineteenth century onwards, became geared to producing knowledge which would then beget further knowledge. It was not orientated towards the production of 'wisdom' in the service of solving the problems of life and procuring what is 'good' for the world. Knowledge, instead, had betrayed the original principles of the Enlightenment.

There are some hints in PaR of Maxwell's discontent with knowledge-inquiry as opposed to wisdom-inquiry. However, the practical business of getting on with making PaR PhDs possible and assessing large amounts of researcher practice has arguably meant that discussions around knowing have decelerated in recent years. Some in PaR discussions have resuscitated an old distinction of knowing offered by Christopher Frayling in respect of 'research into art', 'research for art' and 'research through art' (Borgdorff 2007; Mottram 2009). Many have tried to co-opt Polanyi's notion of 'tacit knowledge' to recapture some of the unspoken and unconsidered aspects of practice, including those that are lodged in bodily work. Alternatively, they have utilized Ryle's distinction between 'knowing that' (associated with knowledge) and 'knowing how' (associated with skill) (e.g. Bolt 2007; Borgdorff 2007). Nelson's work is a good example of a combination of these perspectives in practice. "Key to my approach to PaR", he writes (Nelson 2013, p. 39), revealing the influence of postmodernism and poststructuralism, "is an acceptance that knowledge is not fixed and absolute. Though I accept that 'the scientific method' with its capacities of experimental testability, repeatability and falsifiability has proved valuable, the fact is that it does not produce absolute truths". He goes on to distinguish between "know-how" (e.g. the skill of riding a bike), "know-what" (the critical reflection involved in knowing what is being done or has been done) and "know-that" (the equivalent of "traditional 'academic knowledge'" [2013: 45], the results). Ultimately, Nelson emphasizes "doing-thinking" and "doing-knowing" in PaR; the idea is that in the very act of creating or crafting practice there is an enactment of knowing. Specifically, he cites (Nelson 2013, p. 52) Marina Abramovic's designation of the way knowledge comes from experience as 'liquid knowing'.

This conception of 'knowing' as arising from the experience of practice, including the physical experience of the practice even as it happens, is understandably widespread in theories of PaR. It is sometimes expressed in terms of the work being 'performative' (Haseman 2006; Borgdorff 2007). Indeed, Nelson (2013, p. 66) refers to "the performance turn" and Bolt (2016) to a "performative paradigm". However, while Nelson (2013) states that "artistic praxis is performative in that it impacts upon us, does something to us, changes us in all manner of ways (aesthetically, perceptually, ethically, emotionally, even physically)" (p. 56), he does not embrace the designation itself because PaR already implies the 'doing' that the iteration of practice constitutes. This is certainly one of the reasons that PaR is the term used in the current essay, although the argument does not work for all commentators (Haseman, for example, as a proponent of the performative, rejects PaR in favor of the term 'practice-led research'). Yet, while the 'performative' does address the 'doing' of research in the pursuit of practice, it is worth remembering that the general idea comes not necessarily directly from the original 1962 distinction of performative and constative utterances proposed by Austin, but from the influential poststructuralist writings on identity of Judith Butler. As such, 'performative' practice is, once more, aligned with identity formation and construction in discourse.

What practice performs – the process of its knowing - is also bound up with its materials. For many advocates of PaR, then, a 'materialist' perspective is required. Paul Carter (2007) notes the marriage processes when he states that "the distinct focus of creative research, is located neither after nor before the process of making but in the performance itself" (p. 19). In his book, *Material Thinking* (2004), Carter discusses a number of artistic initiatives in which he has been involved and the way in which he considers them to be practices where the meaning of the artwork is not detached from the matrix of its production. Any conception of the work that practice does, in this perspective, should be evaluated or interpreted not just with reference to the final product but also in the interaction of materials, including the bodily involvement of the practitioner. Bolt (2007) largely concurs with Carter's 'material thinking' and specifically invokes the concept of 'handlability' – derived from a philosopher beloved of the poststructuralists, Heidegger – to offer some explication of the materiality of bodily involvement. She writes,

> I would agree with Carter that it is in the joining of hand, eye and mind that material thinking occurs, but it is necessarily in relation to the materials and processes of practice, rather than through the "talk", that we can understand the nature of material thinking. Words may

> allow us to articulate and communicate the realizations that happen through material thinking, but as a mode of thought, material thinking involves a particular responsiveness to or conjunction with the intelligence of materials and processes in practice. Material thinking is the logic of practice (Bolt 2007, p. 30).

What can be seen in this exchange is an admirable striving for means to recognize, appraise and find the proper proportional place for nonverbal communication in human interaction. In this aspiration, discussion of materiality in PaR shares something with contemporary semiotics. However, it is less clear that poststructuralism, with its emphasis on linguistic signification, however playful, will be able to assist. What 'materialism' offers to PaR besides a focus on materials is an attempt to delineate the role of the researcher. Possibly poststructuralism has some limited purchase here. In traditional, natural and social science approaches to research, as has been noted, the focus has been on the product and the methodology (see, for example, Brewster 2009, p. 126). Indeed, Haseman and Mafe (2009, p. 212), suggest that the traditional researcher has had to conform to "methodological 'hygiene'". The PaR researcher, by contrast, is very much caught up in the vagaries of the situation and her/his own agency. Schön (1984, p. 308) notes that "research is an activity of practitioners. It is triggered by features of the practice situation, undertaken on the spot, and immediately linked to action". More emphatically, still, Sullivan (2009, p. 52) states that "the artist intuitively adopts the dual roles of the researcher and the researched, and the process changes both perspectives because creative and critical inquiry is a reflexive process". He adds that a viewer or reader is also "changed" by an encounter with an art object/research texts because the encounter can challenge and bring into play "new possibilities". What PaR theorizing does quite appositely, then, despite the contested terrain on which it operates and the different approaches it encompasses, is to tie up materiality, reflexivity and what, in cybersemiotic terms, one would call 'first person experience' – either of the practitioner or audience member. As Midgelow (2019, p. 112) sums up,

> PaR involves thinking through doing, unpacking assumptions about the practice through the practice, such that the researcher enters into a dialogue with her emerging materials and the creative processes develop through internally derived, often non-linear, logics. In this way the knowledge that is embodied in movement is not simply pre-cognitive, nor is it a demonstration of a pre-theorized intellectual position.

Yet, there is the feeling that amidst attempts to marry these concepts and perspectives, the purview in which the marriage occurs is quite limited and possibly even parochial. What PaR theory seems to lack is a broader overview of practice within the domain of signification and cognition in general. That is, its considerations of materiality do not always pay close attention to semiosis in the technologies that comprise practice, including technologies that are part of the human body. Moreover, its peregrinations on first-person experience and reflexivity do not situate the semiosis of practice within the extensive domains to which they belong. So, it has been seen that discussions of PaR are usually conducted within a frame of reference that includes cultural studies, postmodernism, poststructuralism and so forth. Invoked authors include Merleau-Ponty, Butler, Lyotard, Derrida, Heidegger and Deleuze, recurring, along with Polanyi, favored posthumanists (Haraway) and, sometimes, references to the whipping boys of ‘Continental Philosophy’, such as Descartes and Plato. Absent from discussions of PaR is the significant literature on nonverbal communication from the last 70 years, the equally large amount of literature on non-human animal communication (very much concerned with nonverbality, of course) developed over the same period, writings in contemporary semiotics (particularly biosemiotically-orientated work), second-order cybernetics, philosophy of science, media and communication theory, or distributed perspectives. Authors *not* invoked include the late Latin philosophers, Edward T. Hall, Kendon, Peirce, McLuhan, Luhmann, Maturana, Uexküll, Sebeok, Gibson and many others. Of course, as mentioned, instituting PaR has been a struggle and so strenuous has it been that, on top of that and on top of the workload of the modern academic generally, it is probably unreasonable to expect recurrent excursions outside academics’ disciplinary or theoretical comfort zone. However, given how germane the aforementioned areas are for PaR, opportunities are being missed. One of the main such opportunities, perhaps, is in respect of working to provide a unified theory of PaR.

6.4 Cybersemiotics and the Knowing of PaR

Of course, unifying theories are rather anathema in poststructuralist perspectives. However, consider two related issues that are omnipresent in PaR: ‘embodiment’ and ‘nature’. The first is named frequently, but the second is comprehensively eschewed, even when implicit in discussions. The problem that has not really been worked through in relation to ‘embodiment’ concerns its fecundity. Frequently, PaR theorizing refers to ‘embodiment’ with reference to the materiality of practice, the fact that it often involves bodies and performance (Midgelow 2019; Brewster 2009; Borgdorff 2007). Yet such reference misses the opportunity to use the insight that has developed in the literature associated with ‘cognitive science’ where the idea of ‘knowing’ has been thoroughly released from its Cartesian mooring and repeatedly shown to be inseparable – as a process, act or instinct – from the bodies where such knowing must occur. As Hoffmeyer (2018) has recently explained, phenomena such as ‘causality’ are really only carried through the experiences of the body; yet they are assumed to be in the head because they are processes of knowing or understanding. In PaR theorizing, though, there is a frequent elision in the literature between *embodiment of phenomena in art practice* and *embodiment as knowing in the body*. There is acknowledgment that knowing might be embodied in practice; but seldom is there an explication or fruitful expansion of that observation. Two exceptions are: Melrose (2011), who makes a similar point to the one here, suggesting that ‘embodiment’ has become a shibboleth; and Nelson (2013), who makes the general proviso that, “By using the term embodied we mean to highlight two points: first that cognition depends upon the kind of experience that comes from having a body with various sensorimotor capacities, and, second, that these individual sensorimotor capacities are themselves embedded in a more encompassing biological, psychological and cultural context” (p. 48).

The vexed matter that Nelson is opening up can be seen in the first of the three contexts he mentions. For not only is the human body an issue, but knowing in all kinds of bodies must be germane to a theory of practice which touts its materiality as decisive. If this is the case, then nature as a whole – not just as it applies to the context of humans in society, but as the crucible of knowing in all species – cannot be dismissed as a mere construct in discourse. If PaR operates predominantly at the level of the nonverbal, then there seems to be little sense in failing to consider the status of nonverbality as a massive phenomenon comprising non-human animals. In contrast with much PaR theorizing, cybersemiotics (Brier 2008), embedding much of biosemiotics, compels a vision of life, consciousness and cultural meaning as constituted by the continuities of nature and evolution. It does this as a fully-fledged contribution to philosophy of science rather than a shrill protest at the traditional scientific hegemony. It certainly challenges physicalist science, with its ideal of third person knowledge. Yet it does so with an interest in elucidating the potentially neglected kinds of knowing that are involved in first person embodied consciousness – that is, the feelings and affects that are undergone, rather than just a 'third person' assessment of the mechanics and structure of the practice.

Cybersemiotics is therefore an example of what might be called a 'science of knowing'. The phrase comes from a paper by Kalevi Kull (2009) in which he identifies "*Φ*-sciences", characterized by universal laws and quantitative methods, and "*Σ*-sciences" concerned with local semioses and using qualitative research to investigate its 'objects'. In the latter, the point is to take into account the 'knowing' of both the organism and its environment. The organism is not treated as a mechanism or a function of its own physical engineering, but as a life form with senses or protosenses. Yet, where *Σ*-sciences take account of the knowing of a non-human species, it is clear that humans cannot 'know' *on behalf* of the organism - they can only produce a 'copy'. That copy has customarily been verbal: sometimes in speech, but often in writing for more extensive dissemination. In these cases where a human makes such a copy in an account of a non-human organism, the human's physical apparatus for knowing dictates that anthropic knowing will be different from the knowing of the non-human with its much different physical apparatus. That is acknowledged in *Σ*-sciences because their focus is not at the level of the individual agent, finding out what each individual organism knows; instead, it is at the level of the species, positing the organism's knowing in particular instances (including first-person experiences or equivalent) based on what is generally understood of the species' capacity for knowing.

Now, in the case of the human artistic practitioner, attempting to know about non-human animals, similar problems prevail. In the case of the same practitioner attempting to know about other humans, it is still not automatically true that an accurate picture is easy to ascertain. However, at least humans share the same physical apparatus for knowing. As a result, a human-human account of knowing has the potential to be more insightful than a human-non-human animal one. That does not mean that it avoids having to deal with problematic relationships, of course. The social sciences, with their own human-human accounts, constantly attempt to negotiate the complexities of human agents and their environment. In PaR, the situation is similar, in that taking 'knowing' into account will include the relationship between the materiality of the practitioner's working objects as well as the many first-person factors that make up the context of the practice. Moreover, PaR has certain advantages of knowing over the social sciences. PaR has facilitated a nonverbal 'copy' as well as, or opposed to, the verbal 'copy' upon which traditional research has relied. This enables PaR to 'report' on human phenomena of emotions, feelings, experiences and bodily sensations that cannot be expressed well in verbal form. Similarly, the sensitivity to nonverbality may profitably serve art-based human investigations into non-human knowing.

In the science of 'knowing' called biosemiotics which informs so much of cybersemiotics, the theory of *Umwelt*, introduced by the Estonian-born German theoretical biologist, Jakob von Uexküll is therefore central (Uexküll 1992, 2001a, b, 2010; Deely 2009; Kull 2001; Brentari 2015). *Umwelt* is the means by which organisms "capture 'external reality'" (Sebeok 2001, p. 21–2) in response to semioses. Most importantly, though, an *Umwelt* is composed by the circulation and receiving, insofar as it is physically allowed by an organism's sensorium, of signs. Thus, the *Umwelt* of the dog, partly derived from its acute ability to hear high-pitched sounds, differs qualitatively from that of the human whose hearing is focused on a lower pitch. The key point about the human *Umwelt* is that it is intricate and varied in comparison to other animals. Yet, it shares some aspects with other species. The concept of *Umwelt* is very useful in approaching an understanding of species' worlds; in the case of humans, though, it allows the investigation of the cultural propensity for projecting *possible* worlds: fictional projections, artistic projections, ethical projections, as well as those associated with logic and science. For cybersemiotics, too, the concept of *Umwelt* is crucial and is discussed, among other ways, with reference to Reventlow's study of sticklebacks (Brier 2008, p. 168).

As part of cybersemiotics' contribution to philosophy of science, *Umwelt* offers a powerful reminder that the senses of a species and its members are by no means to be neglected in gauging their knowing. This is not a difficult idea, nor is it problematic to see the matter in species terms: after all, no great feat of imagination is required to realize that a dog's sense of smell is central to its knowing. Likewise, *Umwelt* could be indispensable to PaR: Brett Buchanan (2008) has shown how the work of von Uexküll has informed that of Heidegger, Merleau-Ponty and Deleuze; rather than grappling with the way that such difficult neologised concepts as 'handlability' obscure von Uexküll's observations, it is surprising that PaR theory has failed to consult the original source of discussion on the senses and tactile dispositions. Of course, considering the connection of knowing to all living nature, whether through the concept of *Umwelt* or not, rather upsets the idea that the world is constructed in the human phenomenon of discourse. At the very least, in an *Umwelt* view, the world will be constructed through the senses, including those shared with non-human animals.

6.5 Transdisciplinarity and the “Cybersemiotic Star”

Much as *Umwelt*, as a concept, cuts through the thicket of confusion surrounding the relation of human senses to the apprehension of the world, it cannot represent the final word on organism, environment, cognition, signs and reality. None of these are issues to be settled by one discipline. For this reason, cybersemiotics is transdisciplinary, tracking those areas in the humanities and the sciences where there have traditionally been materialist, organismic orientations in understanding phenomena and where there have been semiotic, cognitive orientations, also seemingly dictated by the phenomena with which they have been most concerned. As Kathrine Johansson notes (2016, p. 7) in the *Cybernetics and Human Knowing* special issue on arts and cybersemiotics, human understanding of materiality has primarily been derived from the discipline of physics but the task is to link ontologies from the physical and technical sciences to the development of narratives concerning society and culture, as well as first-person experience. Nelson (2013), too, recognizes that “Hard knowledge and liquid knowing need not be seen as two sides of a binary divide” (p. 60). The task of linking ontologies, then, requires a commitment to transdisciplinarity, particularly to address the failure of all disciplines to recognize and adequately account for the first-person experience of fundamental feelings or qualia; indeed, this last observation could quite easily be incorporated into a manifesto for PaR in the section where ‘knowing’ and ‘feeling’ are discussed.

Cybersemiotics attempts to address the slow progress made, even among theories of embodiment, in understanding the role of emotions. It thus recasts the status of ‘knowing’ *contra* the computational information-processing paradigm. That is to say, cybersemiotics contrasts with – although does not abandon - those forms of third-person knowledge-enquiry where ‘meaning’ has no place. In physics and information theory, for example, what humans or other organisms know or feel about a process or an object is of absolutely no consequence. What is important to physics and information theory’s enquiry is the ‘third person’ assessment of how something works or how it is physically constituted. Yet, as cybersemiotics insists, such a perspective is limited because, after quantum theory, even particles cannot be guaranteed to act in the ways that engineering would predict; and, after the notion of *Umwelt*, animals and humans cannot be defined as machines that are divorced from the configuration of their sensoria (Brier 2008).

So cybersemiotics has attempted to produce a perspective in which are synthesized the insights into systems, including living systems, which are offered by the traditional scientistic pursuits of engineering and physics. These include observations on how matter and energy behave. Yet such observations are thoroughly tempered by philosophical and epistemological outlooks that embrace meaning, consciousness and culture. From the matter/energy perspective is gained the dimension of materiality; from the systems perspective, it is shown how embodiment – the fact that a body is needed for knowing to even take place – unites evolution and meaning; from the cultural perspective is given the domain of interpersonal interaction and communicative relations; and from the inner world perspective the role of affect and first person experience is made visible. Brier's (2010, p. 1907–1911) "cybersemiotic star" sums up the synthesis.[1]

It is an approach to knowing which not only promotes forms of knowing – such as PaR - alternative to those of traditional science, but actually provides co-ordinates for thinking about the place of such forms of knowing in the universe. It is not simply a blanket antagonism towards physicalist views. Indeed, rather than providing another small narrative, what is probably most important about cybersemiotics for PaR is that it dares to provide a unified theory of PaR's central concerns.

6.6 PaR and Mediation Beyond the Human

Having so many seemingly discrete areas to cover, it is no surprise that the quality of knowing in relation to PaR is still under-explored, even though the institutionalization of practice is already somewhat underway in the Western academy. Elkins (2014b), in particular, is cautious, questioning whether definitions of research are settled – and whether that is a good thing – and whether 'knowledge' is sufficiently defined for adequate proceedings to assess PaR. Aside from cybersemiotics, one of the rare instances in which the quality of knowing within a wider perspective of human knowledge efforts is broached comes in an (again) admirably clear essay by Borgdorff (2011). Borgdorff rightly identifies PaR as being "at the interface of phenomenology, cognitive sciences and philosophy of the mind" in its concern with "non-conceptual knowledge and experience as embodied in practices and products" (p. 43). As with cybersemiotics, he then goes on to consider the wider context of human knowing: the humanities and its approaches; social sciences' qualitative research; and science and technology. Ultimately, he sees the concerns of PaR converging with those of phenomenology, focusing "attention on the nature of perception and the constitution of intentionality and normativity, beyond an ontology in which the world was thought to be independent of our situatedness" (Borgdorff 2011, p. 59). The non-conceptual bearing of PaR he sees as "materially anchored" but ultimately transcending the materiality of media (p. 52). It would be churlish to criticize Borgdorff's exposition, for it is exceptionally clear-headed and certainly much advanced on other work in its addressing of the broader realm of human knowing. Yet, still, it could go further.

Borgdorff's observations on the relation of PaR to traditional science's forms of knowing are betrayed by the second part of his subheading: "Science and technology". He notes (Borgdorff 2011, p. 52) that art practices are technically mediated practices, involving such paraphernalia as musical instruments, the physical properties of art materials, the structure of a building etc. He also refers to some affinities between scientific and artistic experiments (including demands of

[1] See Chap. 2 in this book for a visual representation of Søren Brier's "Cybersemiotic Star".

reliability, validity, replicability and falsifiability). Moreover, it is true that he refers to bodily technique in dance. What is absent, however, is a more synoptic vision of mediation, allowing more opportunities for development. In the perspective of the Toronto School, as well as in cybersemiotics, the idea of technology would not be restricted to media that are external to the body; rather, the body is a technology in itself, in its movements and ambulations, for example, and also in sensory modes such as sight and hearing. The human shares some of these putative modalities with other animals and, furthermore, humans have extended them into new technologies: writing, print, painting, photography, digital computers and so forth. As Danesi makes clear in his contribution to the present volume, cybersemiotics significantly supplements biosemiotics in analyzing the continuity of knowing across the natural and artificial realms – that is, into the world of non-human organisms and machine knowing. This continuity is important in and of itself for PaR because the *context* of practice – for example, what technologies of the body or beyond are integral to the practice - is susceptible of severe underestimation. In addition, there is the danger of inculcating a view of practice that fosters a humanist conceit about the human's place in the world: separate from, and above, non-human animals and machines. Elsewhere (Cobley 2014, 2016), I have argued that the defense of the arts and humanities has been crippled by this conceit. More practically, it is important to consider the continuity and commonplace nature of knowing across life and into technology.

Now, perhaps more than ever, creative practice is being transformed by the low entry points for artistic enterprise. More affordable technologies mean that practitioners who would have been excluded from participation owing to various social factors, are able to produce estimable photography, film, typeset books, electronic music, light installations, and so on. One hesitates to suggest that this is a democratization on a par with the abolition of the high/low culture distinction effected so many years ago by semiotics, principally because many social and institutional barriers remain. Yet neglecting to consider it amounts to a serious oversight. In addition, in PaR's ruminations on materials, there is perhaps the need to more fully embrace the changes that are being wrought by ubicomp (ubiquitous computing, where environments are transformed into and navigated by way of computing interfaces) and the Internet of things (where devices, including household utilities, are controlled remotely and digitally). For de Almeida (2016), "the blending of information and communication technologies, with living and non-living matter, with human and non-human flesh produces a new kind of hybridization that has not been fully analyzed" (p. 27). For the present discussion, these two last points are indications of why PaR needs the kind of understanding, offered by cybersemiotics, that reveals knowing's much more comprehensive heritage, its cultural evolution and its prospects.

6.7 Continuity and Connection, Process and Practice

One further observation that must be made about a comprehensive, connected and continuous view of knowing concerns the senses and media. Although PaR has not necessarily been restrictive in its embrace of practices, without a more unified perspective on practice it is prone to isolate senses and media. In some discussions, there is the implication that certain senses fit with certain media and certain media fit with certain art practices. Such a view is inevitable when only shorthand accounts of practices can be given as commentaries on PaR attempt to be inclusive. Yet, there would seem to be a need for more circumspection on the reach of senses and media, in a way that a unified theory such as cybersemiotics allows (see Brier 2008, p. 68). Can it really be the case that only one sense or one dimension of tactility is involved when, for example, someone plays music? Just listening to Glenn Gould's grunting on recordings of him playing Bach's Goldberg Variations is enough to remind one that the senses do not operate in isolation. For those who saw him play live, his distinctive posture over the keyboard will have also been registered. The senses, then, can only *theoretically* be taken one by one or as indicative of one modality. In practicality, their connectedness and continuity, as well as their simultaneity, needs to be registered. So, too, can media or materials only be considered as potentially invoking the multiplicity of embodied modalities that exist in any putative, singular modality. Invariably, senses and media are not susceptible to anchoring in stable relationships or delimited and reified entities.

These references to connection and continuity in knowing rather than knowledge and outcomes, inevitably raise the question of what value is to be given to 'product' as opposed to 'process' in practice as research. This is an issue in much PaR theorizing and must be so because writings on PaR are frequently compelled to address institutional imperatives regarding what is actually to be audited or assessed. However, from Schön onwards there has been some disquiet over the fact that universities remain "committed, for the most part, to a particular epistemology, a view of knowledge that fosters selective inattention to practical competence and professional artistry" (Schön 1984, p. vii; Kemmis 1985). Barrett (2007, p. 4) invokes Bourdieu's concern "that because knowledge of the condition of production comes after the fact and occurs in the domain of rational communication, the finished product, the *opus operatum*, conceals the *modus operandi*". Because of the institutional imperative, such as the need of students to gain PhDs to mark their innovation and toil, understandably many seek to underline the importance of product. Nevertheless, many continue to emphasize that the process in practice needs to be considered closely *as well as* just the product. Nelson (2013, p. 64, 67), for example, insists that process should not be ignored and to do so in favor of simply assessing a product is to completely miss the point of PaR. This is not just a matter of the 'process' being analogous to 'methodology' in traditional work; it is because, as has been seen, the process in PaR is iterative and performative in itself, as Haseman (2006) and others assert. Carter (2007) is more forthright, still: "To understand the social value of what we are doing", he writes, "we need to study the process of creativity, rather than its outcomes" (p. 17).

In presenting PaR from a unified, cybersemiotic point of view, concerned with the quality of PaR knowing rather than administrative requirements, it has to be argued that process and product is somewhat of a false opposition. The first reason for this is relatively straightforward. It is because the kind of reified 'knowledge' encapsulated in the 'outcome', the 'contribution to knowledge' demanded in PhD regulations and by research councils, can only be a mere token of the wisdom-inquiry that Maxwell desires to see as the goal of universities. The greater part of the wisdom will reside partly in the response of audiences to the practice and partly in the process - procedures and explorations inherent in the practice. The second reason is less straightforward, but the point needs to be reiterated in strenuous terms, for it is the subject of obscure allusions in PaR commentaries whilst continuing to be counterintuitive to target-orientated policy-makers and educationalists. It is that the outcome of practice *is* the process. That is, as Carter states, the social value is to be found in the process. This is to say, in cybersemiotic terms, that process entails new paths into the further reaches of the human *Umwelt*. As I have argued elsewhere (Cobley 2016), it is human destiny to project new futures, through fictions, planning, ethics and the anticipation of new worlds: through exploration of the *Umwelt* that is afforded to humans by their sensoria. The 'product', if it truly constitutes new knowledge, should be focused on 'knowing how', learning how to learn, a means of navigating new regions of the species' potential.

The future-orientation entailed in the idea of 'process as outcome' is indebted here to von Uexküll and the contribution of his biosemiotics to cybersemiotics. Yet, also running through cybersemiotics is a commitment to the hylozoistic view that Peirce shares with Aristotle, the idea that all matter is in some sense imbued with life. Cybersemiotics shares with Peirce, among many other things (Brier 2017), the conception of matter as possessing an inner aspect of living feeling (effete mind) (Brier 2008, p. 27), qualia as central to human knowing (Brier 2008, p. 363) and an emphasis on semiosis as a process rather than the sign as an 'objective' product (Brier 2008, p. 32). These issues are very much complementary since they all suggest that knowing is a process that, yes, is certainly embodied, but, no, is not to be understood as inhering in humans alone or their brains. Peirce makes the point that, "Thought is not necessarily connected with a brain. It appears in the work of bees, of crystals and throughout the purely physical world; and one can no more deny that it is really there, than the colors, the shapes, etc., of objects are really there" (4.551).

In this light, process is absolutely integral to the discussion – not just as opposed to or supplementing the 'product' in PaR, but in the much wider sense witnessed by the growth of knowing. If PaR is really to fulfill its remit, then fidelity to this broader existence of knowing is essential. What the unified perspective of cybersemiotics allows is not just an apprehension of how *process* can be the ultimate goal of *process* rather than a reified outcome; it also offers the benefit of understanding and guiding practice in evolutionary terms.

6.8 Conclusion

This chapter has not so much been about how to teach and examine and assess PaR. It has taken the opportunity that cybersemiotics affords to open some discussion of the quality of knowing in practice as research. In reviewing some of the PaR theory, developed during a period of opportunity but also great duress in the academy, it has found that some of the debate in the area has been forced to be truncated and narrow. The most available intellectual tradition upon which PaR could draw was, perhaps, not best suited for the purpose of establishing a new paradigm in higher education and research. Whilst practice was able to take advantage of the dismantling of cultural hierarchies that had been inaugurated by semiotics, PaR theory was not always in the best position to capitalize on it. PaR theory inherited from the ‘cognitive turn’ the helpful insight that knowing is not a faculty lodged in isolation in the brain or mind, but requires a body and is distributed not just across that body but also often beyond it too. Yet, PaR also placed humans at the centre of knowing. This was understandable given that it was human practice that was at issue; but apart from failing to conceive of knowing in its broader nonverbal context, across species, it also inherited from the ‘linguistic turn’ and postmodernism the rather dubious belief that the world is ‘constructed in discourse’. Such a narrow, anthropocentric purview, based on discourse and local knowledge (as opposed to ‘grand narratives’) has reached its apotheosis – and nemesis – in liberal appeals to human exceptionalism as a defense against government axes falling on the arts and humanities.

Cybersemiotics, it has been argued, as an intellectual champion of practice since at least the launch of the journal *Cybernetics and Human Knowing* 25 years ago, still has much to offer in advancing the cause of PaR. In its unified theory of knowing, it can guide PaR theory out of some of the cul-de-sacs and overgrown clumps in which it has found itself after pursuing materiality, mediation, modality, embodiment and nonverbality, sometimes as discrete entities and sometimes in an undertheorized fashion. More importantly, it has been argued that PaR is critical at the present moment, for reasons that cybersemiotics is better placed to elucidate. PaR amounts to an indication of the peril in which humans will place themselves if they neglect practice and the arts by dint of failing to see their role at the forefront of human knowing. Seeing PaR in a context that comprises what is known about matter and energy, the functioning of systems, continuity of phenomena across nature, cultural interaction and first-person experience – that is, in a cybersemiotic view – enables an understanding of PaR as knowing that is in complex relations with other knowing. PaR need not simply be posited as a neglected poorer cousin or even as an anti-science position. Instead, it can stand up as an almost immeasurable contribution to the furthering of the human *Umwelt*. If such terminology is too obscure or not to an audience’s taste, then it can be said that practice contributes to human evolution. The problem, of course, is that arguments about long-term benefits are often difficult to make.

Cybersemiotics in respect of PaR, as Johansson (2016) observes, seeks "new important questions that are not necessarily utility-based, and based on a simple, short-sighted frame" (p. 6). Product and short-term value are in demand in the contemporary world, of course; yet, neither the arts, nor the humanities or practice are able to regularly deliver on such demands. The work to make the processual aspect of PaR more appreciated will continue to be very arduous. Merely posing the argument that practice furthers the *Umwelt* or that the process can be the outcome of practice is challenging enough. However, cybersemiotics' placing of PaR knowing within the context of ways we have enhanced knowing as a species to date, at least exemplifies one common experience of the higher learning: that the more you learn, the more you realize you need to learn. Borgdorff (2011) articulates a similar argument: "Especially pertinent to artistic research", he writes, "is the realization that we do not yet know what we don't know. Art invites us and allows us to linger at the frontier of what there is, and it gives us an outlook on what might be" (p. 61). What the outlook for PaR will be depends upon how much humans are prepared to know.

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Chapter 7
The Blind Men and the Elephant: Towards an Organization of Epistemic Contexts

Michael Kleineberg

Abstract In the last two decades of knowledge organization (KO) research, there has been an increasing interest in the context-dependent nature of human knowledge. Contextualism maintains that knowledge is not available in a neutral and objective way, but is always interwoven with the process of knowledge production and the prerequisites of the knower. As a first step towards a systematic organization of epistemic contexts, the concept of knowledge will be considered in its ontological (WHAT) and epistemological (WHO) including methodological (HOW) dimensions. In current KO research, however, either the contextualism is not fully implemented (classification-as-ontology) or the ambition for a context-transcending universal KOS seems to have been abandoned (classification-as-epistemology). Based on a combined ontology and epistemology it will be argued that a phenomena-based approach to KO as stipulated by the *León Manifesto*, for example, requires a revision of the underlying phenomenon concept as a relation between the known object (WHAT) and the knowing subject (WHO), which is constituted by the application of specific methods (HOW). While traditional subject indexing of documents often relies on the organizing principle "levels of being" (WHAT), for a future context indexing, two novel principles are proposed, namely "levels of knowing" (WHO) and "integral methodological pluralism" (HOW).

Keywords Cybersemiotics · Evolutionary semiotics · Integrative levels · Knowledge organization · Classification theory · Library and information science

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7.1 Introduction

The story is old and well-known. In one of its many versions, seven blind men examine an elephant focusing on seven different aspects. The result is seven completely incommensurable descriptions of the very same object of interest. The moral seems to be quite obvious: all these partial truths could be integrated within a bigger picture so long as you have eyes to transcend your own limited perspective. Thus the parable *The Blind Men and the Elephant* illustrates the plurality of epistemic contexts and the related problem of relativism with regard to human knowledge. But like every story, this one is open to different interpretations.

The concept of context (Latin: *contextus* from *contexere* = "to weave together," "interwoven") should itself be considered in context since its meaning ranges between two fundamental opposites as a "dichotomization between objectified and interpretive approaches to context" (Talja et al. 1999, p. 761). Aligned with such a stereotypical understanding of two poles of a continuum, we can find the same distinction within current research on knowledge organization (KO) in the separation of two camps which might be labeled as "modernism" (classification-as-ontology) versus "postmodernism" (classification-as-epistemology) (Mai 1999, 2011; Szostak 2007). The "modernist" approaches tend toward a weak interpretation of the elephant parable seeing the manifold perspectives merely as different aspects of one and the same neutral phenomenon. These ontologically oriented theories consider the known object (the WHAT of knowledge) as something pre-given and completely independent from any observer. In this view, a main goal is to classify the totality of entities or phenomena in a universal and often faceted knowledge organization system (KOS) as neutral and objective as possible (Dahlberg 1974; Poli 1996; Szostak 2007; Gnoli 2011).

In contrast, the "postmodernist" approaches favor a much stronger interpretation emphasizing that observers from different perspectives "see" different phenomena indeed. In this view, the elephant as a metaphor for reality is seen as a social construction depending on the observer's cultural and historical background. As a consequence, the development of context-transcending or even universal KOS's is regarded rather skeptically. These epistemologically oriented theories consider phenomena not merely as pre-given but as constructed by knowing subjects (the WHO of knowledge) which are always situated in horizons of epistemic cultures seen as practice and discourse communities which constitute their own forms of life, language-games, and worldviews (Hjørland 2008; Olson 2010; Mai 2011; Smiraglia 2012). In this chapter, it will be argued that both approaches, although not all mentioned theorists maintain a pure "modernist" or postmodernist" position as we will see, are not sufficient to cope with the challenges of an inter- or transdisciplinary approach to KO as it is legitimately proclaimed, particularly by the *León Manifesto* (www.iskoi.org/ilc/leon.php) (ISKO Italy 2007). As a programmatic outcome of the eighth conference of the Spanish chapter of the International Society of Knowledge Organization (ISKO), the *León Manifesto* proposes a phenomena-based, instead of discipline-based, approach to classification theory which has, of course, its historical precursor in the medieval distinction between “ordo disciplinarum” versus “ordo rerum” (Rötzer 2003, p. 113–122). In current KO research, however, either the perspectivism of a classification-as-epistemology or the universal scope of a classification-as-ontology seem to be neglected. Based on these premises, a systematic organization of epistemic contexts appears as highly problematic. Dervin (2003) writes, “Admittedly in this discussion I have refused to be cowed by the polarized arguments of either the more postmodern contextualists who see nothing but tyranny in systematization, or the more modern contextualists who see nothing but chaos in a fully implemented contextualism” (p. 130).

As an alternative, an integrative approach is proposed based on a combination of ontology and epistemology which might be termed “constructive realism” (Dux 2011, p. 148). In this view, knowledge is seen as both a human construction and, to some extent, a reflection of reality which is partially independent from human observers. The essential consequence for phenomena-based KOS’s such as the *Information Coding Classification* (Dahlberg 2008) or the *Integrative Levels Classification* (www.iskoi.org/ilc) (Gnoli 2011) is a revision of the underlying concept of phenomenon. It will be argued that each phenomenon should be considered as a relation between a known object (WHAT) and a knowing subject (WHO) which is constituted by the application of specific methods (the HOW of knowledge). In other words, phenomena are not seen as independent of the observer but related to perspectivism. Esbjörn-Hargens and Zimmerman (2009) write:

> Perspectivalists maintain that mind—far from being a mirror that passively receives independent phenomena—plays an active role in co-constructing phenomena. Methodologies not only reveal, but also in some respect constitute the phenomena under investigation. What we call “facts,” in other words, are not ready-made but emerge in a complex process of perceptual, emotional, and cognitive negotiation between knower and known (p. 35).

As a consequence, in KO theory the ontological dimension should be seen as inextricably interwoven with the epistemological (including methodological) dimension. Each of them demands a systematic organization based on solid organizing principles; therefore, traditional content or subject indexing (WHAT) should be complemented by something tentatively termed “context indexing,” which takes the viewpoints of the knowing subjects (WHO) as well as the applied methods (HOW) into account. While there seems to be a large agreement between “modernists” and “postmodernists” on the potential benefit of a context indexing, adequate organizing principles are rarely introduced (Weinberg 1988; Begthol 1998; Mai 2003; Szostak 2003; Hjørland 2008; Gnoli 2011).

As a theoretical foundation for a systematic organization of epistemic contexts, cybersemiotics developed by Danish information scientist Søren Brier (2008) offers a non-reductionist approach to a “transdisciplinary integration of knowledge from different viewpoints, methods and subjects areas” (p. 143). Likewise, integral theory developed by American philosopher Ken Wilber (2000b) is widely compatible with the cybersemiotic approach and offers a framework for a comprehensive analysis of the ontological, epistemological, and methodological dimensions of knowledge. The main goal of this chapter is to demonstrate that an implementation of perspectivism and contextualism in any phenomena-based KOS requires a revision of the underlying concept of phenomenon as a triadic relation between the WHAT, the WHO, and the HOW of knowledge.

7.2 The WHAT of Knowledge: Ontology

If the elephant is a metaphor for reality, then the blind men represent the epistemic contexts, i.e., the circumstances of knowledge production which constitute the preconditions and limitations of human knowledge. Esbjörn-Hargens and Zimmerman (2009) write, "what someone calls 'reality' depends on *What* part of reality one is examining, *Who* is doing the examining, and *How* they examine (or which methods they use)" (p. 15). Although these three dimensions seem to be closely related and equally important, the ontological question for the WHAT of knowledge will be the first one addressed. Ontology (Latin: *onto-* from Greek: ὤν, *on*/ὄντος, *ontos* = "being," "that which is") is the study of being and how reality is constituted and structured. Ontological theories are typically concerned with entities, things, objects, phenomena, properties, structures, elements, processes, or simply beings. To keep within the elephant picture, there is a plethora of phenomena ranging from anatomy to brain physiology to DNA sequence to food habits to herd behavior or even psychopathology. One of the main tasks of a comprehensive KOS is to integrate all these topics or knowledge subjects in a systematic way indicating their thematic interconnectedness.

The point of departure for ontologically-oriented approaches is that reality itself underlies a certain structure which can be adopted as organizing principle for KOS's based on entities or phenomena. In KO theory, there exists a long and today widely spread tradition of relying on the concept of "levels of being" (Dahlberg 2008, 163) also known as "levels of reality" or "integrative levels" (Austen 1969; Huckaby 1972; Foskett 1978; Spiteri 1995; Gnoli and Poli 2004; ISKO Italy 2007; Szostak 2007; Dahlberg 2008). Gnoli (2008) writes, "One suitable principle to classify phenomena independently from disciplines has been found to be the notion of *integrative levels*, also referred to as "levels of organization" or (less accurately) "levels of complexity." These terms refer to the observation that world phenomena belong to different ontological levels, spanning from the material, to the organic, the mental, and the cultural" (p. 178–179).

The basic idea is that cosmic evolution emerges in levels of increasing complexity and integration at which each higher level includes and transcends the lower levels (Blitz 1992). This is the reason why the integrative levels, often depicted as a hierarchy of concentric circles, are following a chronological order. A simple example is given by the sequence atom—molecule—cell—organism (Feibleman 1954). The integrative character of such levels can be illustrated with the elephant, which as an organism is composed of cells which themselves are composed of molecules and so on. Interestingly, most discipline-based KOS's rely implicitly on the notion of evolutionary order and the levels of being manifested in a typical sequence such as physics—chemistry—biology—psychology—social sciences/humanities (Dousa 2009). One of the earliest attempts to develop a universal KOS based on entities or phenomena are the works by the Classification Research Group (CRG) during the 1960s. The basic schema of the proposed *New General Classification* is explicitly oriented on the organizing principle of "integrative levels" (see Fig. 7.1 based on Huckaby 1972, p. 101–102).

The motivation for the development of phenomena-based approaches to KO is to overcome the constraints of the prevailing discipline-based classifications, in particular, their under-determined attribution of documents or knowledge subjects to

Fig. 7.1 CRG basic schema

Physical entities
Level
I Fundamental particles
II Atoms, isotopes
III Molecules
IV Molecular assemblages, e.g. solids

Chemical entities
I Elements
II Compounds
III Complex Compounds

Heterogeneous non-living entities
I Minerals
II Rocks
III Physiographic features
IV Astronomical entitics

Artefacts
I Raw materials
II Processed raw materials
III Components
IV Finished articles

Biological entities
I Viruses
II Orgenelles
III Cells
IV Tissues
V Organs
VI Systems, e.g. digestive systems
VII Organisms
VIII Communities, e.g. shoal, herd

Man
I Individual
II Group
III Local community
IV National community
V International community

Mentefacts
I Units, e.g., digit, note
II Words, numbers, bars, etc.
III Sentenses, formulae, musical phrases, etc.
IV Paragraphs, themes, etc.
V Complete works, philosophical systems, etc.

one single classification entry as well as the adaptation of new scientific developments (Foskett 1978; ISKO Italy 2007). The decisive advantage of a phenomena-based KOS is seen in its nature as a "'one place' classification" (Hjørland 2008, p. 338), which enables a non-redundant organization of entities often used as point of reference for further facets (Gnoli 2008, 2011; Gnoli and Szostak 2009). The basic schema of the *New General Classification* proposed by the CRG is based on phenomena, but is not developed to a final and applicable version since the organizing principle of integrative levels appears to be inconsistent because of various branching and dead-ends within the hierarchical classificatory structure (Huckaby 1972; Spiteri 1995). The foundational work of the CRG inspired some following endeavors such as the *Information Coding Classification* (ICC) developed in the 1970s by Ingetraut Dahlberg. In ICC, the main classes are organized according to nine levels of being. Dahlberg (2008, S163) lists them as follows:

General forms and structures
Matter and energy
Aggregated matter (cosmos and earth)
Biological objects (micro-organisms, plants, animals)
Human Beings
Societal Beings
Material products of mankind (products of economy and technology)
Intellectual products (scientific, information and communication products)
Spiritual products (language, literature, music, arts, etc.).

In opposition to the CRG's level model, the ICC classifies material artifacts after biological entities, since they depend on the historical appearance of human beings. Nevertheless, the human related main classes (5–9) seem to violate both the chronological and the integrative principle. On the one hand, areas such as technology, science, and language are interdependent and should be considered as developing not in a linear sequence but in co-evolution. On the other hand, intellectual products like literature and music are not composed of societal beings or material products in the same way as molecules are composed of atoms. These kinds of problems challenge most phenomena-based KOS's organized according to the principle of levels of being as is the case with the international project *Integrative Levels Classification* (ILC), which adopts the underlying organizing principle for its own title (Gnoli 2008). The development of the ILC's basic schema is inspired by James Feibleman's (1954) "laws of the levels" and by Nicolai Hartmann's (1953) categorical analysis (see Fig. 7.2 based on Gnoli 2008, p. 184).

The basic problems of applying the integrative levels principle in a coherent way are discussed particularly by Claudio Gnoli and Roberto Poli in their explicit ontological approach to knowledge organization (Gnoli 2008; Poli 1996, 1998, 2001, 2006; Gnoli and Poli 2004). Gnoli (2008) writes, "While material and organic levels can be arranged in a linear sequence quite easily, mental, social, and cultural levels look more 'tangled'" (p. 187). For example, mental phenomena such as perceptions, emotions, or thoughts seem to be categorically different from both material phenomena (interior versus exterior) and social phenomena (individual versus

Fig. 7.2 ILC basic schema

Layers	Strata	Hartmann
A forms	Form	Logical
C spaces	Matter	Material
D particles		
E atoms		
F molecules		
G bulk matter		
I celestial obj.		
J rocks		
K landforms		
L cells	Life	Organic
M organisms		
N populations		
O instincts	Mind	Psychic
P consciousness		
Q signals		
R social welfare	Society	Spiritual
S land products		
T artifacts		
U wealth		
V organizations		
W cultures	Culture	Spiritual
X art works		
Y knowledge		
Z wisdom		

collective). Following Hartmann's ontology, Gnoli and Poli argue to diminish the level concept in distinguishing between truly integrative levels ("layers") and non-integrative levels ("strata"), although it is recognized that the "relation between strata generally remains unanalyzed and quite mysterious" (Gnoli 2008, p.185). Furthermore, their proposed level model seems not to be appropriate for social or cultural phenomena at all (see Fig. 7.3 based on Poli 1998, p. 203).

These inconsistencies of the underlying level model are seen as open problems and challenges for recent classification research, although Poli considers also

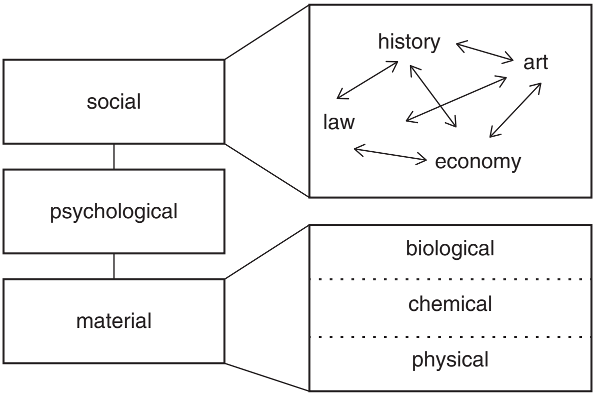

Fig. 7.3 Integrative and non-integrative levels

alternative principles for modeling levels of being. The first alteration might be called the principle of co-evolution. Poli (2001) writes:

> I wish at least to suggest that a different opinion is possible … that the realm of material phenomena acts as the basis, as the bearer, of *both* mental *and* social phenomena. In their turn, the realms of mental and social phenomena reciprocally determine each other. The underlying idea is that there are no societies without minds, just as there are no minds without corresponding societies. Put otherwise, mental and social systems are formed through co-evolution: the one is the environment prerequisite for the other (p. 173–174).

The second alteration might be called the principle of panpsychism. Poli (2001) continues:

> The reductionist approach has historically relied on the help of a materialistic metaphysics. The different orientation offered by the theory of the levels may likewise rely on the support provided by a different metaphysics – in this case, a panpsychist theory which holds that the ultimate nature of the universe is that of a society of minds. Before this view is held up for ridicule, it should be remembered that it has been put forward by no less thinkers than Leibniz, Brentano and Whitehead (p. 280).

In the following, an alternative level model will be introduced, which takes these two principles into account. Both of them have historical precursors; the principle of co-evolution is emphasized, for example, by William Morton Wheeler or George Herbert Mead, while the principle of panpsychism is postulated particularly by Conwy Lloyd Morgan (Blitz 1992). The proposed AQAL model (akronym for "All Quadrants, All Levels") is developed by Ken Wilber as the core element of his integral theory and offers, at the price of a radical divergent ontology, a more consistent model of levels of being (Wilber 1997, 2000a, b). Integral theory, quite similar to cybersemiotics, is an attempt to integrate knowledge across disciplines and domain-specific perspectives in order to enhance transdisciplinary research. The concept of transdisciplinarity (Latin: *trans-* = "across," "over," "beyond"), which following Erich Jantsch "signifies the interconnectedness of all aspects of reality" (Klein 1990, p. 66), covers also the connotation intended by its inventor, the Swiss philosopher Jean Piaget, not merely to embrace all disciplines but also to transcend scientific knowledge as such (Nicolescu 2010; for the derived concept of "postdisciplinarity," see Esbjörn-Hargens 2006, p. 82). This means to honor also non-scientific knowledge forms such as mythic narratives and other folk knowledge which contribute a remarkable amount to the cultural heritage we collect and organize in our memory institutions such as libraries, museums, and archives.

In opposition to linear level models, the AQAL model is divided into four main areas of phenomena or quadrants based on two fundamental distinctions reflecting the categorical differences between singular/plural (or individual/collective) and inside/outside (or interior/exterior). These quadrants are seen as co-evolving and highly interdependent but at the same time irreducible to each other (see Fig. 7.4 based on Wilber 2000b, p. 198).

The upper right quadrant ("Behavioral") represents exterior-individual and only in that sense "objective" phenomena described in a third-person-language (e.g.,

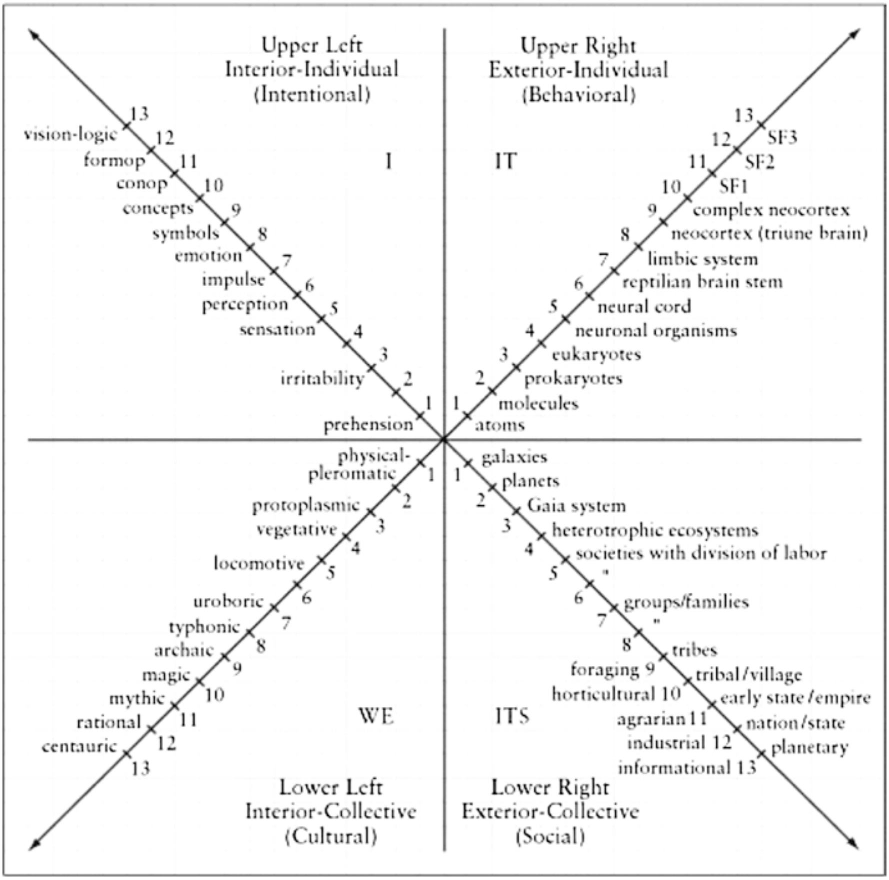

Fig. 7.4 AQAL basic schema

behavior and organism), the upper left quadrant ("Intentional") represents interior-individual and only in that sense "subjective" phenomena described in a first-person-language (e.g., consciousness and knowing), the lower left quadrant ("Cultural") represents interior-collective and only in that sense "intersubjective" phenomena described in a dialogical second-person-language (e.g., worldview and culture), and the lower right quadrant ("Social") represents exterior-collective and only in that sense "interobjective" phenomena described in a third-person-language (e.g., society and environment). The basic idea of integrative levels is a hierarchy of emergent levels characterized by increasing complexity and integration: "Evolution is indicated not necessarily by increasing size but by increasing depth, or degree of structural organization" (Wilber 2000b, p. 565). Accordingly, the AQAL model depicts cosmic evolution from the big bang (origin of ordinates) to today in a series of successive developmental stages.

Following Erich Jantsch, the human brain is the most complex entity known, and the upper right quadrant (exterior-individual) represents some of the main stages or levels of emergence as a sequence from atoms to molecules to cells to more and more complex organisms up to human beings ("SF" stands for "structure function" as a place holder for brain physiological counterparts of complex consciousness evolution, see Feinberg 2011). According to the principle of co-evolution, mental phenomena like perceptions, emotions, or symbolic and conceptual thinking correspond with neural or physiological states, in other words, consciousness development parallels brain development and is represented in the upper left quadrant (interior-individual). For example, the cognitive competences of fish and amphibians ("neural chord") are limited to simple perceptions, while reptiles ("brain stem") possess also impulses and rudimentary emotions; furthermore, lower mammals ("limbic system") and higher mammals ("neocortex") are increasingly able to more complex forms of cognition. Beyond that, human beings can develop linguistic ("concepts"), concrete-operational ("conop"), formal-operational ("formop"), or postformal ("vision-logic") modes of thinking (for a discussion of postformal cognition see Alexander and Langer 1990; Wilber 2000b). In cognitive and comparative psychology, such levels of cognitive competence are typically modeled as developmental stages based on the principle of integrative levels (Campbell and Bickhard 1986; Tobach 1987). Correspondingly, consciousness evolution can be traced back to phylogenesis, although its roots seem to be blurred and obscure.

The principle of panpsychism underlying the integral model maintains that exterior and interior developments are equiprimordial which means to have the same origin in time and to co-evolve from the beginning. In opposition to popular theories of emergent evolution, consciousness phenomena in a broad sense of a first-person-perspective are not supposed to jump suddenly into existence ex nihilo but to develop successively from vague beginnings to forms of increasing complexity and integration (Wilber 2000b). Not only Alfred N. Whitehead concedes a specific form of interiority ("prehension") even to atoms, but Søren Brier (2008), referring to Charles S. Peirce, also argues for panpsychism: "The implication of this is that qualia and 'the inner life' are potentially there from the beginning" (p. 99). Although in strong opposition to present mainstream views, such a notion has always been an underlying theme in the history of Western thought and is put forward by philosophers like Galen Strawson or cognitive scientists like David J. Chalmers even today (Skrbina 2005). Nevertheless, it is not necessary to adopt a panpsychist worldview to apply the framework of integral theory in a fruitful way since the beginning of consciousness evolution could easily be represented in higher stages in the upper left quadrant.

In the lower half of the model, the collective counterparts of exterior and interior phenomena are depicted since evolution is not limited to single entities (microevolution) but also includes systems or societies of these entities (macroevolution) (Jantsch 1980, p. 75–182). In the lower right quadrant (exterior-collective), the levels of material macroevolution are represented as they correspond with the levels in microevolution. For example, at the level of atoms, the most complex phenomenon in macroevolution is a star as integral part of a galaxy or supergalaxy. Likewise, at the level of molecules, the most complex phenomenon is a planet; at the level of cells, the most complex phenomenon is an autotrophic ecosystem (also known as "Gaia system" coined by Lynn Margulis and James Lovelock), followed by heterotrophic ecosystems in which, for the first time, organisms metabolize other organisms. Furthermore, collective levels of increasing complexity are represented up to the appearance of human societies, which themselves can develop through different stages from foraging to horticultural and agrarian to industrial and informational societies. According to the principle of integrative levels, each level includes and transcends the lower levels, for example, the existence of an ecosystem depends on the existence of a planet which itself depends on the existence of a star or a galaxy.

Finally, in the lower left quadrant (interior-collective), the levels of intersubjectivity are represented as they manifest in human societies as shared worldviews. In other words, consciousness evolution is an interdependent process related to both microevolution (psychogenesis) and macroevolution (sociogenesis). Habermas (1984) writes, "As is well known, Piaget distinguishes among stages of cognitive development that are characterized not in terms of new contents but in terms of structurally described levels of learning ability. It might be a matter of something similar in the case of the emergence of new structures of worldviews" (p. 68). The reconstruction of such a long-term development of worldview structures is the main concern of the historico-genetic approach in sociology of knowledge which also leads to stage models following the principle of integrative levels (Piaget 1973; Hallpike 1979; Habermas 1984; Kitchener 1987; Piaget and Garcia 1989; Oesterdiekhoff 1997; Dux 2011; Wenzel 2000; Robinson 2004; Tsou 2006; Bammé 2011).

To what extent we can speak of intersubjectivity at the sub-human levels depends on the chosen starting point of consciousness evolution in general. For example, biosemiotics concedes specific modes of intersubjectivity also to simple organisms and cells (Brier 2008), whereas Whitehead, as quoted by Poli, considers even the atomic level as a "society of minds." The labels of the quadrants (consciousness, behavior, culture, and society) should be taken in the same sense of terminological analogy, since these concepts are obviously anthropocentric, whereas they are meant to embrace all successive levels and merely indicate specific categories:

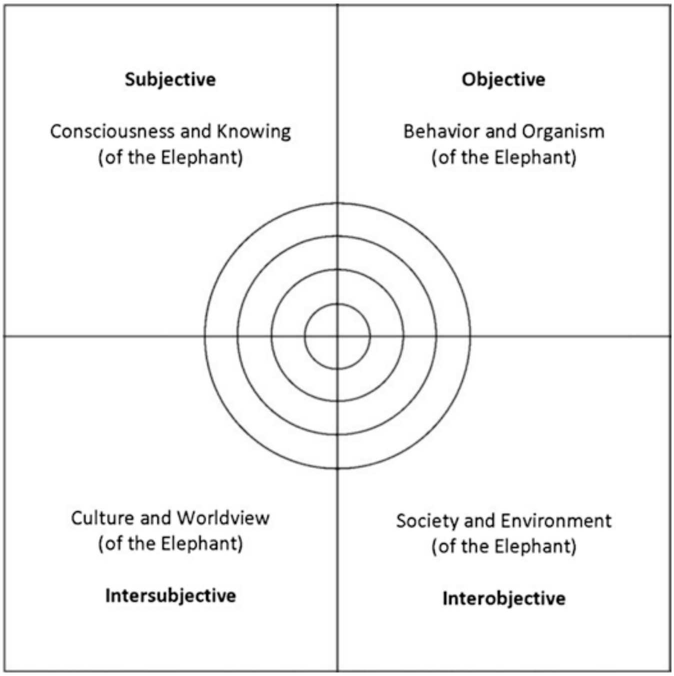

Fig. 7.5 Levels of being (AQAL)

subjective, objective, intersubjective, and interobjective (see Fig. 7.5). The "quadrants" and "levels" can be considered as the basic schema of the AQAL model. However, in order to locate phenomena even more precisely the integral framework introduces further elements which should at least be mentioned here. Within the level sequence in each quadrant, there are different more or less independent developmental "lines" (e.g., in consciousness evolution there are lines of cognitive, moral, ego, or value development) and specific "types" (e.g., feminine or masculine) of such lines, supplemented by temporary "states" (e.g., anger, happiness, flow or peak experiences) (for an introduction see Combs and Esbjörn-Hargens 2006; Esbjörn-Hargens 2010). Admittedly, Wilber emphasizes that many details have to be completed and that the basic schema of his integral model is "nothing but a simple schematic summary to help further discussion" (Wilber 1997, p. 72).

In comparison to traditional linear level models such as the ILC's basic schema, the advantages offered by the AQAL ontology based on the principles of co-evolution and panpsychism, although the latter is merely a logical consequence of the former, becomes more apparent (see Table 7.1). While in ILC, "matter" is considered as the lowest main level, in AQAL, material phenomena are represented by the right-hand quadrants embracing all levels of complexity from atoms to brains and from galaxies to computers of the information age. Following Pierre Teilhard de Chardin, the main levels in the integral model are termed "physiosphere" (1–2), "biosphere" (3–8), and "noosphere" (9–13), the latter derived from Greek νοῦς,

Table 7.1 Level models

	Needham	Feibleman	Hartmann	ILC	Brier	AQAL
Atom	Inorganic	Physical	Material	Matter	Physical	Physiosphere
Molecule		Chemical			Chemical	
Cell	Biological	Biological	Organic	Life	Biological	Biosphere
Organism		Psychological	Psychic	Mind	Psychological	
Human being	Social	Cultural	Spiritual	Society	Linguistic	Noosphere
				Culture		

nous = "mind," "spirit" (Wilber 2000b, p. 15). According to integral theory, all quadrants at each level co-evolve. This implies that, first of all, even the lowest inorganic levels of physiosphere contain diffuse forms of interiority or qualia, and, secondly, that there is a clear distinction between micro or individual phenomena (e.g., atom, molecule) and macro or collective phenomena (e.g., star, planet). In opposition to ILC, in the AQAL's biosphere the areas of "life" and "mind" are not considered as separate and subsequent levels, but as two co-evolving areas of phenomena (right hand versus left hand quadrants) both succeeding the same general level sequence. As all levels, biosphere makes a distinction between individual phenomena (e.g., organism) and collective phenomena (e.g., ecosystem). Finally, ILC's distinction between a material "society" and an immaterial "culture" as subsequent linear levels is replaced by co-evolving quadrants (lower right and lower left) in AQAL's noosphere. The noosphere is also the place to locate technical or cultural artifacts and documents since their historical appearance depends on the human mind and its developmental stages (for pioneering works of a developmental approach to the organization of cultural artifacts see Goldmann 1975; Gebser 1985; Thompson 1996; Combs 2005).

In opposition to traditional linear level models, the co-evolutionary AQAL model offers for the first time a consistent concept of integrative levels in terms of both the integrative principle as well as the chronological principle. Accordingly, the integral model provides a conclusive level concept even for social, cultural, and mental phenomena which seem to be treated more intuitive and unmethodical in previous phenomena-based KOS's (Huckaby 1972; Spiteri 1995; Gnoli and Poli 2004). For example, from the perspective of integral theory, Poli's areas "history," "art," "law," and "economy" in Fig. 7.4 are not considered as genuine levels of being but as specific developmental lines which itself can evolve through different levels of complexity. Furthermore, the differentiation in four quadrants reflects the "differentiation of three values spheres" (Habermas 1984, p.164), which can be seen as a main achievement of modernity, also denoted as "knowledge areas" (Brier 2000, p. 444) or "The Big Three" (Wilber 2000b, 149). By those means, some fundamental context references are made visible which seem to be rather marginalized in KO theory (see Table 7.2).

In conclusion, the traditional organizing principle "levels of being" could benefit from the differentiation in co-evolving areas of phenomena in a considerable way. From the perspective of integral theory, one of the most important challenges for

Table 7.2 Value spheres and validity claims of knowledge

	Objective/interobjective	Intersubjective	Subjective
Plato	The truth	The good	The beautiful
Immanuel Kant	Pure reason	Practical reason	Judgment
Max Weber	Science	Moral	Art
Martin Heidegger	Um-welt	Mit-welt	Selbst-welt
Karl Popper	World 1	World 3	World 2
Jürgen Habermas	Truth	Rightness	Truthfulness
Günter Dux	Physical world	Social world	Inner world
Søren Brier	Nature	Culture	Spirit
Ken Wilber	Third-person-perspective	Second-person-perspective	First-person-perspective

knowledge organization is the notion of developmental levels of interiority which are supposed for both levels of consciousness in psychogenesis (interior-individual) and levels of worldviews in sociogenesis (interior-collective). Such a novel organizing principle might be termed "levels of knowing" (Campbell and Bickhard 1986, p. 1), which can also be labeled as "levels of representation" (Gnoli and Poli 2004), "levels of description" or "levels of interpretation" (Poli 2001, p. 261–62), "levels of abstraction" (Piaget and Garcia 1989, 264), or "levels of consciousness" (Wilber 2000b, p. 214). But this refers already to the epistemological dimension of knowledge which should be treated in the next section.

According to integral theory, however, these two dimensions are inextricably interwoven: "In my view, the basic structures in the Great Nest [= "levels of reality," M.K.] are simultaneously levels of both knowing and being, epistemology and ontology" (Wilber 2000a, p. 236). Likewise, the cybersemiotic approach is fundamentally based on such an integrative level model, considered as "combined ontology and epistemology, conceptualized as … levels of existence and knowing" (Brier 2008, p. 389). In other words, there are not only different levels of being but at the same time different levels of knowing the being. Admittedly, the "modernist" approaches to knowledge organization consider the epistemological dimension as secondary when maintaining a primacy of the ontological dimension as it is programmatically expressed in the *Integrative Levels Classification* project: "Its unities of classification are phenomena, considered as neutral objects of knowledge, independent from any approach or viewpoint by which they can be treated" (ISKO Italy 2007, p. 8; see also Gnoli and Poli 2004; Gnoli 2012). In this view, the points of reference are pre-given ontic structures which implicate that the validity of knowledge is seen as completely independent from the contextuality of knowledge production. In recent theory of knowledge as well as in the philosophy of science such a view is seen as metaphysical thinking and, therefore, hopelessly outdated as pointed out by Habermas (1992): "Such internal connections between genesis and validity have been uncovered by pragmatism from Peirce to Quine, by philosophical hermeneutics from Dilthey to Gadamer, and also by Scheler's sociology of knowledge, Husserl's analysis of the lifeworld, the anthropology from Merleau-Ponty to Apel, and postempirist theory of science since Kuhn" (p. 49).

Conclusively, neutral or context-independent knowledge simply does not exist. For that reason, each phenomenon has to be considered in its own context of discovery (or more precisely: context of genesis). As a consequence, for a phenomena-based KOS, it is mandatory to organize epistemic contexts in a systematic way, as will be sketched out in the next two sections.

7.3 The WHO of Knowledge: Epistemology

If the elephant is a metaphor for reality, then the blind men do not only represent the access points to an object under investigation but also indicate the fact that knowledge is always knowledge by someone. In other words, even if the seven blind men each examine the elephant's trunk the result could be seven completely incommensurable descriptions. This refers to the epistemological question for the WHO of knowledge. Epistemology (Greek: ἐπιστήμη, *epistéme* = "cognition," "knowledge") is the study of knowledge and how it is acquired and influenced. According to Hjørland and Hartel (2003, p. 242), epistemological theories are typically concerned with:

- "approaches"
- "metatheories"
- "movements"
- "paradigms"
- "philosophies" (of discipline X)
- "regimes" (e.g., treatment regimes)
- "schools" (of thought and research)
- "systems" (of thought and research)
- "traditions" (academic)
- "trends" (in a field)
- "views" (point of views).

According to the weak interpretation of the parable by the "modernists," there would be only one valid representation of reality, while all the others would be biased, incomplete, or deluded in some way. But such an assumption implicates the possibility to have a view from nowhere or a God's eye perspective which allows to see reality how it "really" or "in itself" is (realism). In contrast, the strong interpretation by the "postmodernists" denies the existence of such a privileged point of view arguing for a plurality of equally valid viewpoints since there is no place from which to compare divergent constructions of reality in an unbiased way (anti-realism). A mediating role between these extreme positions could be taken by a metatheoretical standpoint which might be termed "constructive realism." Dux (2011) writes:

> Let us note that each and every organization of life is only capable of forming in an autonomous universe by keeping this autonomy in mind. If one takes this into account, a postulate results regarding the constructivism of human knowledge that can hardly be negated: this constructivism must be able to integrate reality into its constructs in such a way that reality-based knowledge is gained…. By taking this turn at least provisionally, the theory of knowledge would assume a position compatible to what I term *constructive realism* or *realistic constructivism* (p. 148).

In combining epistemology and ontology, this theory of knowledge seeks to integrate both the undeniable constructivism of human knowledge as well as its capability to reflect reality which is seen as partially independent from a human observer. In other words, neither the premise of pre-given ontic structures nor the premise of arbitrary epistemic constructions of reality are required, two extreme positions also known as the "myth of the given" invented by Wilfried Sellars and the "myth of the framework" coined by Karl R. Popper (Esbjörn-Hargens and Zimmerman 2009, p. 563). Thus, an integration of the "modernist" and "postmodernist" approaches requires, on the one hand, a defense of a realistic standpoint since there is a resistant outside world partially independent from human beings as a point of reference or corrective for learning processes including for our social constructions of reality (Bickhard 1993). On the other hand, we have to recognize that the knowing subject is always an integral part of reality which implies that there is no view from nowhere (external realism), but only perspectives embedded in various contexts (internal realism).

Following Hilary Putnam, George Lakoff, and Mark Johnson, as well as Martin Heidegger's notion of being-in-the-world, Brier (2008) comes also to the conclusion: "Internal realism is the only realism we can have" (p. 145) In this respect, his distinction between "objective reality," which is rejected, versus "outside reality," which is accepted, seems to be crucial (Brier 2008, p. 233). Therefore, the situated lifeworld of the knower has to be taken into account. Habermas (2009 my translation) writes, "Anticipatory, the lifeworld can be described as the non-exceedable, only intuitively accompanying horizon of experience and as the fundamental, not consciously present background of a personal, historically situated, corporally embodied, and communicatively socialized everyday existence" (p. 204). Referring to Habermas and Merleau-Ponty, Brier analyses the contextuality of human knowledge in some more detail. Brier's (2008, p. 360–362) results replicate the fourfold distinctions of the integral model (for further convergence between cybersemiotics and integral theory see Esbjörn-Hargens and Zimmerman 2009, p. 555):

> But I do contend that the foundation for understanding the sciences, social sciences, arts, humanities, and practical sciences, as well as philosophy and other systematic searches for meaningful, justified, and true public knowledge, must begin with the prerequisite that human beings are:
>
> 1) embodied and biologically situated – our body is the principal system for the manifestation of life and cognition;
>
> 2) conscious and intentionally situated – consciousness is the source of an inner life of cognition, volition, feeling, and perceptual qualities (qualia);

> 3) meaning-situated in cultural practice – that is, through language in a social and cultural activity with a network of other living, linguistic, conscious systems; and
>
> 4) environmentally situated – in a nature or a universe that is partly independent of our perception and being.
>
> Each of these four worlds demands its own type of narrative.

For a systematic organization of epistemic contexts, these "four worlds" or quadrants identified by Brier and Wilber offer a reasonable point of departure: behavior and organism (objective), consciousness and knowing (subjective), culture and worldview (intersubjective), society and environment (interobjective). Since both the known and the knower have to be seen as integral parts of reality, the AQAL model enables not only to locate the known objects in the ontological dimension but equally the knowing subjects in the epistemological dimension, in our case the prerequisites of the blind men (see Fig. 7.6). The integral model visualizes the interdependent relations between four multi-leveled quadrants seen as contextual main areas in order to avoid the pitfalls of monocausal explanations of human knowledge, how they are occasionally postulated by reductionisms such as physicalism (objective), psychologism (subjective), sociologism (intersubjective), or even holism (interobjective) (Esbjörn-Hargens and Zimmerman 2009). The way a phenomenon (Greek: φαινόμενον, *phainómenon* = "that which appears," "occurrence") is

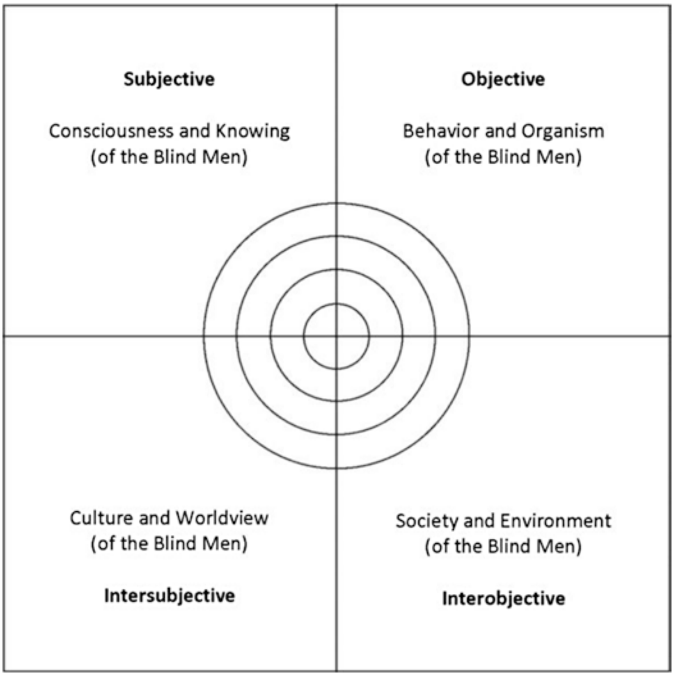

Fig. 7.6 Levels of knowing (AQAL)

perceived and described depends on a complex context which as a non-exceedable horizon and pre-understanding influences our theoretical and metatheoretical background assumption as Hjørland emphasizes in a debate with Szostak (Hjørland and Pedersen 2005; Hjørland 2008, 2009, 2010; Szostak 2008a, b, 2010). Hjørland (2008) writes:

> However, what Szostak ignores is that different theories "see" different phenomena in the world and uses different methods as well. Szostak seems to suggest that there is a neutral position from which the world can be observed objectively. I believe this is wrong. In the philosophy of science have an "interpretive turn" taken place and the hermeneutic circle is now acknowledged as a fundamental condition. This turn implies that all interpretations are circular, indetermined, and perspectival. This is also the case when describing and classifiying phenomena (p. 337–338).

Therefore, integral theory considers the phenomena classified in the AQAL basic schema not as pre-given ontic entities but as "largely-agreed-upon orienting generalizations from the various branches of knowledge" (Wilber 2000b, p. 5). At this juncture, the denominations of the AQAL main classes are mostly adopted from other theorists, in particular, Erich Jantsch, Gerhard Lenski, Jean Piaget, Erich Neumann, Jean Gebser, Erik Erikson, and Alfred N. Whitehead. In other words, phenomena should not be seen as objective and neutral representations of reality but as time-dependent (re-)constructions which are in potential need of revision. The present scientific theories are the point of reference but understood as manifestations of historically situated worldviews. Therefore, even the most valid scientific knowledge is considered as potentially obsolete in order to avoid ahistorical thinking: "In this way, ontological theories change as conceptual and social structures … change" (Hjørland and Hartel 2003, p. 24). As a consequence, the common criticism raised by Elaine Svenonius (2004) that the concept of integrative levels is necessarily based on a referential or picture theory of meaning does not hold since even a contextual or instrumental theory of meaning is compatible with the notion of stable patterns in nature such as nested hierarchies. In this paper, however, it is argued for a combination of both as it is proposed by integral theory or cybersemiotics.

But even a differentiation of the epistemological dimension into quadrants as areas of contexts seems not to be sufficient to face the challenge of relativism which is often concluded from perspectivism in claiming that each perspective is equally correct and valid: "It would be difficult to argue that only one of the classifications is true representation of the knowledge and others are *not* true – or that one is more true than the others" (Mai 2004, p. 41). Therefore, the main task for any transdisciplinary approach to KO is to show how the manifold domain-specific perspectives are interrelated in order to provide a point of departure for mutual understanding, concept translation, and perspective taking as proclaimed, for example, in the *León Manifesto*: "the new KOS should allow users to shift from one perspective or viewpoint to another" (ISKO Italy 2007, p.6; see also Szostak 2007, p. 76; Kaipainen and Hautamäki 2011, p. 509). The "modern contextualists" (Dervin 2003, p. 130), in claiming a primacy of ontology, tend to a reification of contexts, treating them merely as aspects or facets of a given phenomenon, whether it is an elephant or an ordinary pen as in an analog example. Gnoli and Poli (2004) write, "All these different descriptions are correct: each of them expresses a facet of the object. Yet they are all descriptions of the same object. Hence, one of the main tasks of information science is to find ways to integrate different descriptions of the same object" (p.152).

But such a view marginalizes the differences of contradicting perspectives, and, even more important, relies fundamentally on the metatheoretical assumptions of external realism which has been rejected by most theorists in the philosophy of science for decades. In separating the known object from the knowing subject, such a weak notion of context mistakes the constitutive role of the epistemological dimension with regard to human knowledge. The conclusion: though the "modernist" approaches to KO maintain a universal scope, these theories are not able to adequately implement perspectivism and contextualism.

In contrast, the "postmodern contextualists" (Dervin 2003, p. 130), in claiming a primacy of epistemology, tend to an absolutization of contexts in overemphasizing the arbitrariness of knowledge construction. In constructivism, phenomena are legitimately seen as products of the epistemic activity of human beings, in the way that the blind men investigating the elephant give not merely different descriptions but "see" different phenomena. In other words, the elephant in itself or a neutral description of the elephant does simply not exist since there is always an observer co-constructing the object of interest. But postmodernism at least in its stronger versions as stereotypically described by Mai (1999) or Szostak (2007) commonly concludes that epistemic pluralism implies epistemic relativism. Therefore, most "postmodernists" insist that the scope of any KOS should be limited to specific "knowledge-domains" (Hjørland and Hartel 2003, p. 242) seen as practice and discourse communities which constitute their own forms of life, language-games, and worldviews. In other words, a context-transcending such as a transdisciplinary or universal KOS is judged as unfeasible from the beginning (Jacob 2000; Mai 2004; Hjørland 2008). Such a view seems to underestimate the reality-based aspects of human knowledge in relying on the metatheoretical assumptions of anti-realism. Obviously, such an absolutist constructivism possesses no criteria to make the divergent social constructions commensurable since the grasp on reality is completely lost (Bickhard 1993). In rejecting a partially human-independent reality, such a strong notion of context mistakes the constitutive role of the ontological dimension with regard to human knowledge, in particular as reference point for learning processes as well as for cross-contextual translations. Wilber (2000b) writes, "We *can* translate languages because, even if all contexts are situated, a great number of contexts are *similarly situated* across cultures. "Context" does not automatically mean "relative" or "incommensurable" (p. 629).

The conclusion: Though the "postmodernist" approaches to KO take perspectivism and contextualism into account, these theories are not well equipped to defend a context-transcending not to mention universal scope of a KOS. Both approaches do not appear to be sufficient for an adequate transdisciplinary integration of knowledge. Thus, the point of departure for an alternative approach should be a metatheoretical position based on a combination of both ontology and epistemology which would implicate a multi-dimensional knowledge concept (Brier 2008, p. 205–06).

Onion and Orange (2002) write, "*Knowledge* is a transient state at the confluence of what is known, how it is known (knowing), and who knows it (knower)"(p. 5).

In difference to the "modernist" and "postmodernist" positions rather stereotypically contrasted in this paper, some main protagonists in recent discourse represent much more balanced points of view. On the one hand, the interdisciplinary approach proposed by Szostak (2007) argues also for a third alternative, acknowledging that "human perceptions of reality are to some extent constructed and to some extent constrained by external reality" (Szostak 2007, p. 46). Referring to Habermas, Szostak even attacks epistemic relativism since "scholars engaged in an open honest conversation can aspire to increased understanding" (Szostak 2007, p. 41). On the other hand, Hjørland (2008) emphasizes that to accept perspectivism does not mean to accept anti-realism: "I do not believe this leads to skepticism or antirealismus, because some theories do a better job than others" (Hjørland 2008, p. 338). But neither, however, comes to the self-evident conclusion that human knowledge as the confluence of the known and the knower has to be seen from a developmental perspective how it is offered, for example, by the historico-genetic approach in the sociology of knowledge (Dux 2011) or by integral theory (Wilber 2000b). Esbjörn-Hargens and Zimmerman (2009) write:

> During maturation the human worldspace [= "levels of knowing", M.K.] expands and deepens enormously in many different ways. Because a more expansive and inclusive interior allows a more comprehensive worldspace to emerge, some assertions made about a given phenomenon are more comprehensive, and thus have greater validity, than other claims. Hence, integral perspectivalism is not equivalent to relativism. We do not assert that all perspectives are equal. Some truths are more comprehensive than others (p. 8).

In ontogenesis, as well as in phylogenesis (or more precisely: in historiogenesis), reconstructive sciences such as cognitive psychology or cognitive anthropology are able to identify different developmental stages of cognitive competence or levels of knowing from which one and the same object can be seen as different phenomena. Again, the elephant parable can give us an illustration: within a premodern magico-animistic worldview structure (pre-operational cognition) the elephant might appear as a totemistic animal ghost, whereas within a mythic-metaphysical worldview structure (concrete-operational cognition) the elephant would rather be recognized as one creature in the middle of a divine creation. Likewise, within a modern rational-scientific worldview structure (formal-operational cognition) the elephant would be considered as a biological organism and product of a natural evolution, whereas within a postmodern pluralistic worldview structure (postformal cognition) the elephant is seen as an integral part of complex ecosystems and as an autopoietic form of life which constitutes its own species-typical construction of reality (for a detailed reconstruction of worldview structures see Habermas 1984, p. 43–74; Wilber 2000b, p. 210–261; Bammé 2011, p. 73–250; Dux 2011, p. 257–374).

At least, such a strongly simplified example indicates the discontinuity between the levels of knowing, which is why metatheoretical approaches based on a combined ontology and epistemology label such a view as "multi-stage realism" (Neuhäuser 2003, p. 178; my translation, M.K.) or "genetic ontology" (Fetz 1982, my translation) in analogy to the well-known genetic epistemology proposed by

Piaget. Although the chronologically later and more complex levels of knowing include the cognitive competencies of its precursors, none of these stages should be ahistorically regarded as the ultimate level of knowing since development is an open process.

In other words, the "postmodernists" would legitimately emphasize that there simply is no elephant "in-itself" but merely perspectives. Following cybersemiotics and integral theory, elephants as well as other phenomena do indeed exist independently from human observers but the crucial point is they do not exist independently from any observer at all. An elephant seen by a conspecific, respectively a cell, a molecule or even an atom seen by the likes of them, appears as a phenomenon, but as a significantly different one as for a human being whether a tribal cave painter or a scientist socialized in a postmodern information society. Certain phenomena (e.g., an elephant as molecular-biological phenotype of an evolutionary developed DNA sequence) only "appear" within a specific level of knowing, which is why these phenomena literally depend on knowing subjects with an adequate cognitive competence: "Real objects are not seen from a perspective—they are within that perspective" (Esbjörn-Hargens and Zimmerman 2009, p. 179). If one follows the premise of the equiprimordiality of ontic and epistemic development, then both have to be seen as an inextricable unity similar to the well-known equivalence concepts of "space-time" or "energy-matter" (for the ontological-epistemological concept of "dimension-perspective" see Esbjörn-Hargens and Zimmerman 2009, p. 58). According to this view, there is no being without knowing, no knowledge without a knower, and no phenomenon without a level of knowing in which it appears (for the concept of "phenomenological space" or "worldspace" see Wilber 2000b, p. 568–569).

In each case, a reconstruction of the structural development of human worldviews described as hierarchically emerging integrative levels of knowing seems to be promising to enrich theory-building in KO research. Here, the crucial point is the distinction between the content of worldviews (cultural variant surface structures) and the underlying modes of thinking or types of rationality (cultural invariant sequence of deep structures) (Habermas 1984; Dux 2011; Wilber 2000b). According to the principle of integrative levels, the higher and more complex levels of knowing integrate and transcend the lower levels. Habermas (1984) writes:

> With the transition to a new stage the interpretations of the superseded stage are, no matter what their content, *categorically devalued*. It is not this or that reason, but the *kind* of reason, which is no longer convincing…. These *devaluative shifts* appear to be connected with socio-evolutionary transitions to new levels of learning, with which the conditions of possible learning processes in the dimensions of objectivating thought, moral-practical insight, and aesthetic-expressive capacity are altered (p. 68).

From this perspective, even the difference between "modernism" and "postmodernism" appears as a transition between different deep structures implicating a "devaluative shift," which categorically devalues the arguments proposed by a mode of thinking not reflecting the constitutive role of the knowing subject (for a discussion of modernity/postmodernity informed by developmental theory see Dux 2011; Wilber 2000a, b; Bammé 2011). This is exactly the reason why the theoretical foundations of a phenomena-based KO as it is sketched in the *León Manifesto* would not be able to convince anybody from the "postmodernist" camp. In a similar analysis, Jens-Erik Mai identifies the "shift from classification-as-ontology, in which everything is defined as it is, to a more contemporary notion of classification-as-epistemology, in which everything is interpreted as it could be" (Mai 2011, p. 711) as the transition from modern to late modern or postmodern approaches. But a profound criticism of "modernism" in combination with an equivalence thesis claiming that all perspectives are equally correct and valid would involve itself in a performative contradiction (Szostak 2007, p. 77; Esbjörn-Hargens and Zimmerman 2009, p. 63–64). This could be avoided in adopting the non-relativistic concept of levels of knowing as proposed in this paper. In this regard, Kleineberg (2012) identifies a further and even more elementary stage in the history of classificatory cognition which one might add to the "postmodernist" and "modernist" approaches to KO and label as "premodernist." From such a developmental view based on a historico-genetic reconstruction of worldview structures, the question will be inevitably raised how a future approach to KO would look like. A preliminary answer is offered by Wilber (2000b):

> But once consciousness evolves from formal to postformal—and thus evolves from universal formalism to pluralistic relativism—these multiple contexts and pluralistic tapestries come jumping to the fore, and postmodernism has spent much of the last two decades attempting to *deconstruct* the rigid hierarchies, formalisms, and oppressive schemes that are inherent in preformal-to-formal stages of consciousness evolution. But pluralistic relativism is not itself the highest stage of development …. Pluralistic relativism gives way to *universal integralism*. Where pluralism frees the many different voices and multiple contexts, universal integralism begins to bring them together into a harmonized chorus (p. IX).

In this somewhat ambitious attempt to a context-transcending integration of knowledge, the universal scope of "modernism" ("universal formalism") should not be confused with the universal scope of, if you will, "post-postmodernism" ("universal integralism"); similar to the distinction between "world formula thinking" (Brier 2008, p. 274) versus "transdisciplinary integration" (Brier 2008, p. 143). The latter can also be described as an "alliance between perspectivism and realism" (Brier 2008, p. 233) which means that the epistemological dimension is consequently seen as an integral part of reality. In this view, the "postmodernist" assumption of a "multiplicity of co-existing universes" (Jacob 2000, 19) is taken for granted, although, the sum total of the divergent perspectives is once again seen as a unity, respectively called reality. In order to distinguish such a combined ontological and epistemological concept of reality from the more common view of the merely physical "cosmos," Wilber re-introduces the ancient term "Kosmos" (Wilber 2000b, p. 45) indicating a more holistic view and rejecting what he calls "flatland ontology" (Wilber 2000b, p. 695) also known as "desert ontology" (Campbell and Bickhard 1986, p. 23).

Accordingly, an adequate description of a known object would be an integration of the manifold mutually contradictory perspectives. Esbjörn-Hargens and Zimmerman (2009) write: "In one sense, integral knowledge of a phenomenon is the totality of interpretative perspectives taken on it by investigators using reliable methods" (p. 565). The crucial question is how and to what extent we are able to organize the perspectival and contextual pluralism which are embedded in human knowledge without falling prey to epistemic relativism. Szostak (2007) writes: "The basic tenet of postmodernism is that scholars cannot rationally choose among competing perspectives: Only by showing that it is possible to integrate across different perspectives can postmodernism be transcended" (p. 76). In this regard, the concept of levels of knowing how it is developed, in particular, in integral theory offers a promising organizing principle. In contrast to relativism, this view argues that within the history of science (or more precisely: the history of knowledge) several discontinuities occur, but at the same time we are able to reconstruct an overarching coherence within the long-term development of human cognition (Habermas 1984; Lerner and Kauffman 1985; Bickhard 1993; Oesterdiekhoff 1997; Dux 2011; Wenzel 2000; Wilber 2000b; Robinson 2004; Quilley 2010; Bammé 2011). Piaget and Garcia (1989) write: "in the case where one cognitive structure gets replaced by another, larger one, the old structure becomes integrated within the new one, which permits the continuity of knowledge" (p. 275).

In opposition to Thomas S. Kuhn's famous thesis of incommensurability between subsequent paradigms, Piaget and Garcia (1989, p. 252) make a distinction between "social paradigm" versus "epistemic paradigm," whereupon only the latter is able to identify and interrelate divergent scientific perspectives in terms of "lower level theory" versus "higher level theory" (Piaget and Garcia 1989, p. 264–65) in a non-relativistic way (Kitchener 1987; Tsou 2006). In analogy to traditional subject indexing, the attempt to classify knowledge by taken perspectives or points of view might be termed "theory indexing" (Greek: θεωρία, *theoría* = "a looking at," "viewing") or even more comprehensive "viewpoint indexing." This proposed supplement to indexing theory is to a lesser extent seen as an indexing of single scientific theories but to a higher degree as indexing of more basic metatheoretical assumptions and most important of levels of knowing how they manifest themselves in discourse-specific language-games and worldviews: "The challenge for the indexer is to interpret the world picture … embedded in the document" (Mai 1999, p. 554).

Epistemic contexts, however, are not limited to the viewpoints or perspectives (theory) but also include the methods (praxis) applied by the knowing subjects. For this reason, both of them could be subsumed to the epistemological dimension; however, in this paper it will be emphasized that phenomena are always the result of applied methods. In opposition to the weak interpretation that methods are seen as merely means to discover an objectively given reality, the strong interpretation will be adopted that, in fact, methods co-construct the phenomena under investigation (Jacob 2000; Hjørland 2008). Furthermore, an intersubjective validation of human knowledge requires that other researchers are able to comprehend and reproduce the applied methods. Therefore, for a transdisciplinary approach to KO it seems to be appropriate to consider the methodological dimension of knowledge in its own terms.

7.4 The HOW of Knowledge: Methodology

If the elephant is a metaphor for reality, then the divergent descriptions depend not only on the aspect of the known object (WHAT) or on the perspective of the knowing subject (WHO), but equally important on the method applied (HOW). In other words, even if the seven blind men all investigate the elephant's trunk and even if they all share a similar pre-understanding, a common worldview and a set of language-games, the result could be seven completely incommensurable descriptions again. In particular, Szostak (2003) argues that scientific documents should not only be classified by subject but also by the theories and methods applied by scholars in order to enhance interdisciplinary knowledge transfer. But while theories tend to change over time and new theories emerge in a rather unmanageable way, methods do not. According to Szostak (2003, p. 26), there is a fair amount of fundamental and more or less well-defined methods which provide a foundation of what one might term "method indexing":

There are, broadly speaking, some 12 distinct methods employed by scholars (often in combination):

- experiments (including natural or quasi-experiments)
- surveys
- interviews
- mathematical models (and simulations)
- statistical analysis (often, but far from always, associated with models), including secondary (that is, collected by others) data analysis
- ethnographic/observational analysis (some would distinguish "interactual" analysis in which the investigator interacts with those under observation)
- experience/intuition (some would treat this as an important subset of observational analysis, since we are in effect "observing" ourselves here)
- textual (content, discourse) analysis
- classification (including evolutionary analysis)
- mapmaking
- hermeneutics/semiotics (the study of symbols and their meaning)
- physical traces (as in archaeology)
- some would treat "evaluation" of programs as distinct, though it can be seen as a combination of some of the above methods. Similar arguments can be made with respect to "demography," case study, feminism, and perhaps also hermeneutics. Certainly, "case studies" involve the use of one or more of the above methods.

This list includes quantitative (knowledge by description) and qualitative (knowledge by acquaintance) methods as well as analytical tools with regard to methodological individualism (elements) and methodological collectivism (systems). In this respect, such a methodological pluralism seems to be appropriate to cover all three value spheres and its distinct validity claims. But a mere list of methods, however, does neither describe how these practices are related nor how to combine them in a meaningful way as an added value for multi-, inter- or transdisciplinary research (for terminology, see Klein 1990, p. 55–73). Furthermore, the focus seems to be narrowed to scientific knowledge which would limit a future method indexing only to a fraction of the whole cultural heritage (for the complementary concept of "folk method," see Esbjörn-Hargens and Zimmerman 2009, p. 66).

The AQAL model, already applied to the ontological and epistemological dimensions, provides a framework to systematize the methodological dimension as well. In this regard, Szostak's list of methods which could indeed be analyzed in more detail will be categorized into more general "methodological families" (Esbjörn-Hargens 2006, p. 88). The concept of methodology (Greek: μέθοδος, *methodos* = "a following after," "way of teaching or going") is widely used as synonym to "method" and will be adopted to denote the way someone has to follow in order to access the phenomena under investigation: "Each methodology discloses an aspect of reality that other methods cannot" (Esbjörn-Hargens 2006, p. 87). The AQAL model locates the qualitative methodologies within the left hand quadrants and the quantitative methodologies within the right hand quadrants. In addition, the methodological individualism is represented in the upper quadrants and the methodological collectivism in the lower quadrants. Furthermore, within each quadrant a distinction is made between a direct perspective (inside) and an indirect perspective (outside). As a result, there are eight well-defined zones or methodological families which are irreducible to each other and interrelated in a complement way. As an organizing principle, this systematization is called "Integral Methodological Pluralism (IMP)" (Esbjörn-Hargens 2006, p. 84). The denotations given to the zones are merely general labels which each seek to integrate a manifold of zone-specific methods and techniques (see Fig. 7.7 based on Esbjörn-Hargens 2006, p. 88):

Esbjörn-Hargens (2006) writes:

> In short, IMP is a collection of practices and injunctions guided by the intuition that "Everyone is right!" and each practice or injunction enacts and therefore discloses a different reality. As a result, Wilber proposes three principles that secure a position in reality for all perspectives: nonexclusion (acceptance of truth claims that pass the validity tests for their own paradigms in their respective fields); enfoldment (some sets of practice are more inclusive, holistic, comprehensive than others); enactment (phenomena disclosed by various types of inquiry will be different depending in large part on the quadrants, levels, lines, states, types, and bodies of the researcher used to access the phenomena) (p. 86).

In more detail, subjective phenomena (interior-individual) such as emotions, thoughts, or qualia in general are accessible either directly from a first-person-perspective, or indirectly from a third-person-perspective how it is taken by a therapist with respect to a patient or by a zookeeper with respect to an elephant. In the former case, phenomenological methodologies are applied such as introspection ("experience," "intuition"), in the latter case rather structuralist methodologies, for example in cognitive psychology, are applied ("surveys," "interviews," "observational analysis"). Likewise, intersubjective phenomena (interior-collective) such as cultural backgrounds, shared language-games, values or worldviews are accessible either directly from a participant's perspective ("hermeneutics"), or indirectly from a more distant observer's perspective ("ethnographic analysis"). The fact that intersubjective phenomena can also be studied in pre-human areas is documented by

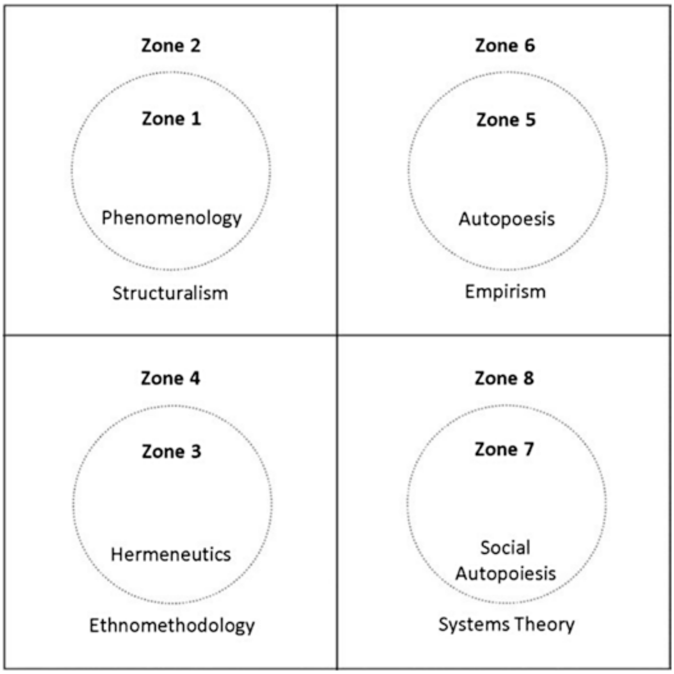

Fig. 7.7 Integral methodological pluralism (AQUAL)

new research developments, particularly, in zoohermeneutics and biosemiotics (Brier 2008; Esbjörn-Hargens and Zimmerman 2009).

On the other side, objective phenomena (exterior-individual) such as an organism of a human being or an elephant are accessible either directly from an internal organism's perspective, or indirectly from an external perspective. The latter is nothing else, but the most common scientific practice of empirism such as counting, measuring, or weighing ("experiments"). In contrast, the former methodology labeled as autopoiesis is one of the less self-explanatory techniques and one of the latest developed in the history of science. This methodological zone is also not mentioned on Szostak's list. Developed by Chilean biologists Humberto Maturana and Francis Varela, autopoiesis seek to examine the biological level of epistemology. The basic idea is to reconstruct how an organism registers its environment, although, not in terms of qualia (interior-individual) but in terms of third-person-language, for example, as a description of how the organism's materiality (sensory organs, messengers, neural impulses, etc.) constitutes its cognition of what is. Such a reconstruction seems to be promising to learn something about the organism's ability to construct its own conspecific reality. Brier (2008, 194) writes, "The main achievement of Maturana and Varela … is that they have conceptualized the basic limits of living and knowing – namely the autopoietic system – and have shown that there is a basic connection between living and knowing: To live is to know!" (p. 194).

Finally, interobjective phenomena (exterior-collective) such as cybernetic systems, biological ecosystems, or human societies are accessible either directly from a system's perspective, or indirectly from an environment's perspective. In the former case, the methodology labeled as social autopoiesis is developed by Niklas Luhmann in adopting Maturana's and Varela's biological approach for social science. In contrast, in the latter case methodologies applied by Ludwig Bertalanffy's general systems theory, Norbert Wiener's cybernetics, or Claude Shannon's mathematical theory of communication consider interobjective relations from a more general and external perspective taken by the researcher (Brier 2008, p. 207–210; Esbjörn-Hargens and Zimmerman 2009, p. 255–56). The added value of the AQAL model in general and the IMP in particular is to function as an orienting map which informs research programs when indicated about their blind spots: "One of the basic premises of Integral Research is that any phenomena under investigation should be examined simultaneously or concurrently from 1st, 2nd, and 3rd person methodologies" (Esbjörn-Hargens 2006, p. 89).

As a prime example, Esbjörn-Hargens and Zimmerman (2009) provide a comprehensive analysis of the ontological, epistemological, and methodological dimensions of more than 200 different approaches to ecology and environmental sciences based on integral theory and the AQAL framework. In KO research, cybersemiotics might be considered as one of the most comprehensive approaches since all three value spheres and its validity claims or, likewise, all "quadrants" are explicitly taken into account in order to put forward a transdisciplinary integration of knowledge (Brier 1996, 1997, 2000, 2003, 2008). In this regard, cybersemiotics can be seen as an attempt to combine the third-person-perspective commonly taken by approaches oriented in cybernetics or systems theory, and the second-person-perspective commonly taken by approaches oriented in semiotics or hermeneutics; and at the same time to integrate the first-person-perspective of phenomenology often neglected in KO theory. Esbjörn-Hargens and Zimmerman (2009) write, "Cybersemiotics has been developed by Søren Brier in the 1990s as an integration of phenomenology, biosemiotics, social autopoiesis, and information science. Cybersemiotics is a transdisciplinary nonreductionist approach to cognition and communication that studies the exchange of information and meaning in organisms…. Zones: 1, 3, 5, 7" (p. 501).

The cybersemiotic approach, however, seems to disclose some "blind spots" by itself as an IMP analysis is able to demonstrate. While the traditional empirical sciences (zones 6 and 8) are taken for granted and function as reference points for a criticism of reductionism, the more structuralist and reconstructive methodologies (zones 2 and 4), which are commonly applied to the long-term development of cognition, seem to be underrepresented, at least at the human level which is crucial for KO. This is somewhat surprising since cybersemiotics, quite similar to integral theory, is heavily influenced by evolutionary semiotics of Charles S. Peirce and based on a level model of being and knowing (Combs and Brier 2000; Brier 2003). In this view, the emergent levels of complexity from cells to frogs to elephants to human beings are simultaneously seen as both levels of being and levels of knowing ("To live is to know!"). Furthermore, Brier emphasizes the importance of a developmental approach even within the human level: “If the human mind did not ‘fall from the sky’ then it developed through evolution” (Brier 2008, p. 428). However, in order to reconstruct the long-term development of human cognition in history such as the shift “from mythos to logos” (Brier 2008, p. 129), we have to consider not only the biological evolution (phylogenesis) but the cultural development (historiogenesis) (Dux 2011). The latter requires reconstructive methodologies since the transitions of human consciousness from one level to another, transitions of deep structures or modes of thinking, are hardly accessible from the inside by direct methodologies such as phenomenology (zone 1) or hermeneutics (zone 3), but demand a distant look from the outside by indirect methodologies such as developmental structuralism (zone 2) or variants of ethnomethodology (zone 4) (Habermas 1984, p. 102–142).

Thus for KO theory, reconstructive approaches to human knowledge based on historico-genetical methodologies seem to be promising, in particular, the more advanced approaches rooted in the Piagetian tradition (Piaget 1973; Hallpike 1979; Habermas 1984; Campbell and Bickhard 1986; Piaget and Garcia 1989; Kitchener 1987; Oesterdiekhoff 1997; Dux 2011; Wenzel 2000; Wilber 2000a, b; Robinson 2004; Combs 2005; Tsou 2006; Bammé 2011; Kleineberg 2012; Seiler 2012). In summary, a transdisciplinary KOS considered as a “‘one place’ classification” (Hjørland 2008, p. 338) should indeed be based on phenomena, although, the underlying phenomenon concept must be re-conceptualized as a triadic relation. In other words, in order to localize a phenomenon we have at least to determine three dimensions of knowledge (for the concept of “kosmic address” introduced by Wilber see Esbjörn-Hargens and Zimmerman 2009, p. 158):

$$\text{Phenomenon} = \text{WHAT} \times \text{WHO} \times \text{HOW}$$

As a consequence, within library and information science an old desideratum can be addressed (Bies 1992): next to a descriptive indexing based on syntactics (e.g., the grammar of bibliography including authority control or alphabetical order) and a subject indexing based on semantics (e.g., subject, aboutness, topicality), there is a need for a context indexing based on pragmatics (e.g., perspective, mode of thinking, paradigm, injunction) which includes both a viewpoint indexing (theory) and a method indexing (praxis) (see Fig. 7.8). In this chapter, it is argued that an adequate implementation of contextualism with regard to human knowledge must be based on a triadic concept of phenomenon and solid organizing principles for each dimension. Three of them are presented here, namely the traditional principle of “levels of being” (ontology), as well as two novel principles termed “levels of knowing” (epistemology) and “integral methodological pluralism” (methodology). Insofar, the desideratum of a systematic organization of epistemic context seems to be redeemable at least in principle, although, the development of specific applications of the proposed WHAT-WHO-HOW approach to knowledge organization will be a matter of further discussion.

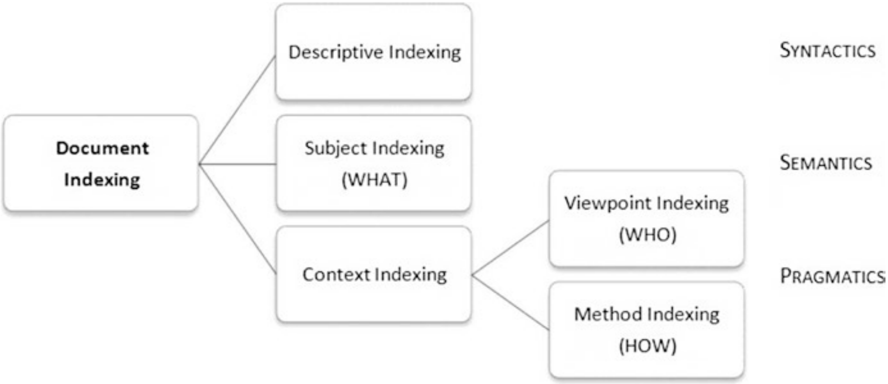

Fig. 7.8 The WHAT-WHO-HOW approach to document indexing

7.5 Conclusion

In essence, the parable of the blind men and the elephant is keeping its moral in both the weak and the strong interpretation. If you have eyes to see, you will get the big picture. The "modernist" exegetes, however, seem to ignore the interpretive turn in the philosophy of science and the now widely accepted constructivism and perspectivism with regard to human knowledge. For this reason, the weak interpretation is only valid within a very limited scope in which the blind men already have a shared worldview and pre-understanding. Only in this special case, the descriptions of the elephant could be integrated into a coherent whole, though a limited whole, and this seems to be the wisdom of the parable, is nothing else but blindness.

In other words, under the conditions of postmetaphysical thinking, a strong interpretation is the only option. The "postmodernist" exegetes would legitimately emphasize that the blind men with their divergent theoretical and metatheoretical frames of reference as well as their methodological pluralism (co-)construct the phenomena under investigation. The question, however, how to make the blind men see again even in this case seems to be completely abandoned by a "postmodernism" which seeks to arrange itself with the aporia of relativism. Indeed, the answer appears to be as simple as conclusive. From a strong interpretation's view, the big picture could be seen in following two steps: Firstly, we should be able to take alternative perspectives by means of sufficient reconstructions of foreign worldviews; and secondly, we should be able to interrelate all these reconstructed perspectives in a systematic and non-relativistic way. This is exactly what the historico-genetic approach in sociology of knowledge is about. Here, the analysis of worldview structures and their transformations in history leads to the concept of levels of knowing considered as developmental cognitive stages of increasing complexity and integration. In other words, this theory of knowledge offers a novel organizing principle as a foundation for the proposed context indexing. Thus these preliminary thoughts about a future context indexing seek to challenge both camps of KO research.

On the one hand, Hjørland's (2008) request to Szostak to offer new arguments for a phenomena-based KOS is addressed by means of the proposed three-dimensional concept of phenomenon. On the other hand, the universal scope of KO how it is defended in Szostak's (2008b) reply is addressed by means of the proposed ontological-epistemological concept of reality which already includes the pluralism of perspectives.

In this chapter, it is argued that if the increasingly accepted precondition that human knowledge is always knowledge in context can be taken for granted, then a systematic organization of epistemic contexts is mandatory for KO theory, in particular, for any phenomena-based approach. The main contribution of this paper might be seen in the revision of the underlying concept of phenomenon which is re-conceptualized as a triadic relation between the WHAT, the WHO, and the HOW of knowledge in order to implement perspectivism and contextualism in the theory of KO. Admittedly, previous phenomena-based approaches to KO are not completely outdated or invalid but they have to integrate the epistemological (including methodological) dimension not merely as another facet but as an constitutive and equivalent component of KOSs. Within the "modernist" camp (classification-as-ontology) optimism seems to predominate in regard to a "universal classification of the phenomena studied by scholars and the theories and methods applied by scholars" (Szostak quoted in ISKO Italy 2007, p. 7), although, the undeniable constructivism of human knowledge is hardly appreciated, which is why the level of reflection offered by recent philosophy of science is out of reach. In contrast, there is a prevailing skepticism within the "postmodernist" camp (classification-as-epistemology) with regard to a transdisciplinary organization of knowledge because the notion of reality is literally lost since the constructivism of human knowledge is seen as open to arbitrary and incommensurable fantasies.

As an alternative, this paper proposes an integrative approach which one might label as "classification-as-ontology/epistemology" based on a triadic phenomenon concept and on three fundamental organizing principles, namely the "levels of being" (ontology), the "levels of knowing" (epistemology), and the "integral methodological pluralism" (methodology) in order to avoid the common fallacy that epistemic pluralism implies epistemic relativism. The end of the story is that the elephant as well as the parable itself is like every phenomenon or narrative open to different interpretations. Each of them might be partially true and none of them might be finally privileged, but this does not mean that all taken perspectives are equally valid or that we are not able to organize them in a meaningful way.

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Chapter 8
Communicology, Cybernetics, and Chiasm: A Synergism of Logic, Linguistics, and Semiotics

Richard L. Lanigan

Abstract The analysis takes up the conjunction of semiotics and cybernetics as a problem in theory construction in the human sciences. From a philosophical perspective, this is also the ontological problem of communicology: the disciplinary study of human communication. My analysis suggests current conceptions of "semiotics" and "cybernetics" are misunderstood because "information" is assumed as synonymous with "communication" and that the axioms of "mathematics" are identical to those of "logics". The evidence contained in the misunderstandings is a conflation of reductionist ecology ideas about the "environment" differentiation of (1) human beings [apperceptive organic life], (2) animals [perceptive organic life], and machines [inorganic and constructed mechanisms]. The communicological view argues that a correct understanding of these issues requires a competence in logics and linguistics to determine the metatheory criteria for choosing evidence among humans, animals, and machines. The domain thematic is the phenomenological synergism of human embodiment as expression and perception. In this context, my criterion for evidence is the structure or form of a pure concept of reason (choice making judgment) that is given a priori in consciousness, the *notion* demonstrated by Immanuel Kant: A notion is a rule that you know before you experience it as a result.

Keywords Culture · Jakobson · Language · Nature · Phenomenology · Positivism · Reductionism

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8.1 The Problematic: Choice of Context

Issues in philosophy and science are complex by their very definition. When we attempt to "introduce" such issues, the classical Greek method of problematic and thematic immediately recommends itself. What question do we ask, how do we answer? We seek to determine *what* is at issue for us and *how* we might approach an understanding of the issue as it applies to us. In short, it is things versus ideas. Our immediate issue is to understand "semio-cybernetics" proposed by Søren Brier (2008, 2009; Thellefsen et al. 2011). Obviously, this neologism is a conjunction of *semiotics* and *cybernetics that* invokes the problematic of metatheory: How do we approach the theoretical ground of two pre-existing theories? As human beings, we look for criteria of judgment that allow us to specify what we *perceive* as experience, how we *express* the meaning of our conscious awareness, along with where and when they join together as *evidence*. What is perceived constitutes the world of Nature (things) and how we express our experience is the world of Culture (ideas). If we take these two problematics (things and ideas) as suggestive of commonalities for us (being human), we discover possible thematics. Our favorite human thematics are (1) thing-ideas. i.e., conceptions of science as "objectivity", and, (2) idea-things, i.e., conceptions of culture as "subjectivity". The easiest methodology for applied work is to choose one thematic and ignore the other one (where and when we do this emerges later on in Fig. 8.16). Here is our issue. Semio-Cybernetics is the suggestion that two thematic methodologies (as "ideas") be combined to find "things". Such combinations are the very process and function of human communication.

While I think this Semio-Cybernetic combination is quite possible and has, in fact, been accomplished already as the discipline of Communicology, I also believe current conceptions of both "semiotics" and "cybernetics" are misunderstood by casual readers, many of whom assume "information" is synonymous with "communication" and that the axioms of "mathematics" are identical to those of "logics". Further, the evidence contained in the misunderstandings is a conflation of reductionist ecology ideas about the "environment" differentiation of (1) human beings [apperceptive organic life], (2) *animals* [perceptive organic life], and machines [inorganic and constructed mechanisms]. The communicological view argues that a correct understanding of these issues requires a background competence in logic and linguistics to determine the metatheory criteria for choosing evidence among humans, animals, and machines (Lanigan 1988b). Further, these metatheory criteria are the domain of the human science of Communicology (Lanigan 2007, 2008, 2012, 2013, 2019; Riebar 1989; Wilden 1972, 1987). The domain thematic is the *phenomenological synergism* of human embodiment as perception and expression (Dreyfus 1972/1992, 2001). In this context, my criterion for evidence will be the technical definition of *notion* demonstrated by Immanuel Kant.

A notion is Kant's category for the structure or form of a pure concept of reason (choice making judgment) that is given *a priori* in consciousness (Lanigan 2018a). Let me say it clearly: A notion is a *rule* that you know *before* you experience it as a *result*. Contrary to modern views of scientism, a rule is not a cause and a result is not an effect. This to say, we cannot confuse conscious *expression* (Rule → Result) with experience *perception* (Cause → Effect). Edmund Husserl builds on Kant to established the founding logic of implication used by Roman Jakobson in this approach to human communication (Holenstein 1974/1976, pp. 25–47).

8.2 The Problematic: Communication as Context

Communicology as a domain of research analysis and synthesis constitutes an account of what and how human beings create *meaning* (usually named *reality* [an *idea* of things]), and, *function* among other persons in a shared world (normally called *actuality* [an *experience* of things]). The universal model for this account of semiosis at all levels of conception is Roman Jakobson's description of science and the place of communication as the *transaction* of behavior/experience and comportment/idea (Holenstein 1974/1976). Figure 8.1 presents a visual context for perceiving the organization of hierarchical complexity of Culture and Nature— a metatheory model of Communicology.

The human science model begins with Philosophy and Linguistics, the complex integration of culture and nature in the language medium of *human speech* (Bühler 1934/1982, 1958; Cobley 2010; Lanigan 2018b). The linguistic domain consists of two fundamental logic functions in human thinking: (1) *distinctive features* in sound production and perception wherein *spatial* differentiation creates historical temporality (embodiment) and (2) *redundancy features* similarly create the *temporal* differentiation of existential spatiality (apperception) (Durt et al. 2017; Fuchs 2018a, b). Distinctive Features function in metonymic order as *series* [e.g., A B C D] and Redundancy Features function in metaphoric order as *blanks* [e.g., , , ,]. So, two "Realities" combine as one "Actuality" [e.g., A, B, C, D,] (Lanigan 2015c). In short, *verbal messages* (unique to human beings) are a *choice-of-context* that grounds [code/context] any further *context-of choice* differentiation [message/contact] of the system in its complexity. Thus, the first circle in Fig. 8.1 is labeled *Linguistics*. In the second circle called *Semiotics*, Messages are contextualized by a controlling *code* that specifies the two conditions of any possible system (= Semiotics): (1) Things inside the system (series), and, (2) Things outside the system (blanks).

Thus, codes establish boundary conditions for specifying the system (space) and its function (time). When and where functions cross the boundary, we experience the "mirror effect" wherein the sign-system doubles itself (double-articulation; meta-physics). Such sign-systems become synergistically *reversible*, r*eflexive*, and *reflective* and constitute the *Anthropological* level (Lanigan 1988a, 1992; see Fig. 8.3). A simple *gestalt* proof of this point is achieved by placing one mirror opposite another mirror (Bühler 1913, 1922). If you do the experiment, notice you are perceiving a *series* of mirrors (*objects*) that are separated from one another by a parallel series of *blanks* (*space* between objects). This rule is famously violated in René Magritte's *reproduction interdite* (1937). Jakobson's human science model

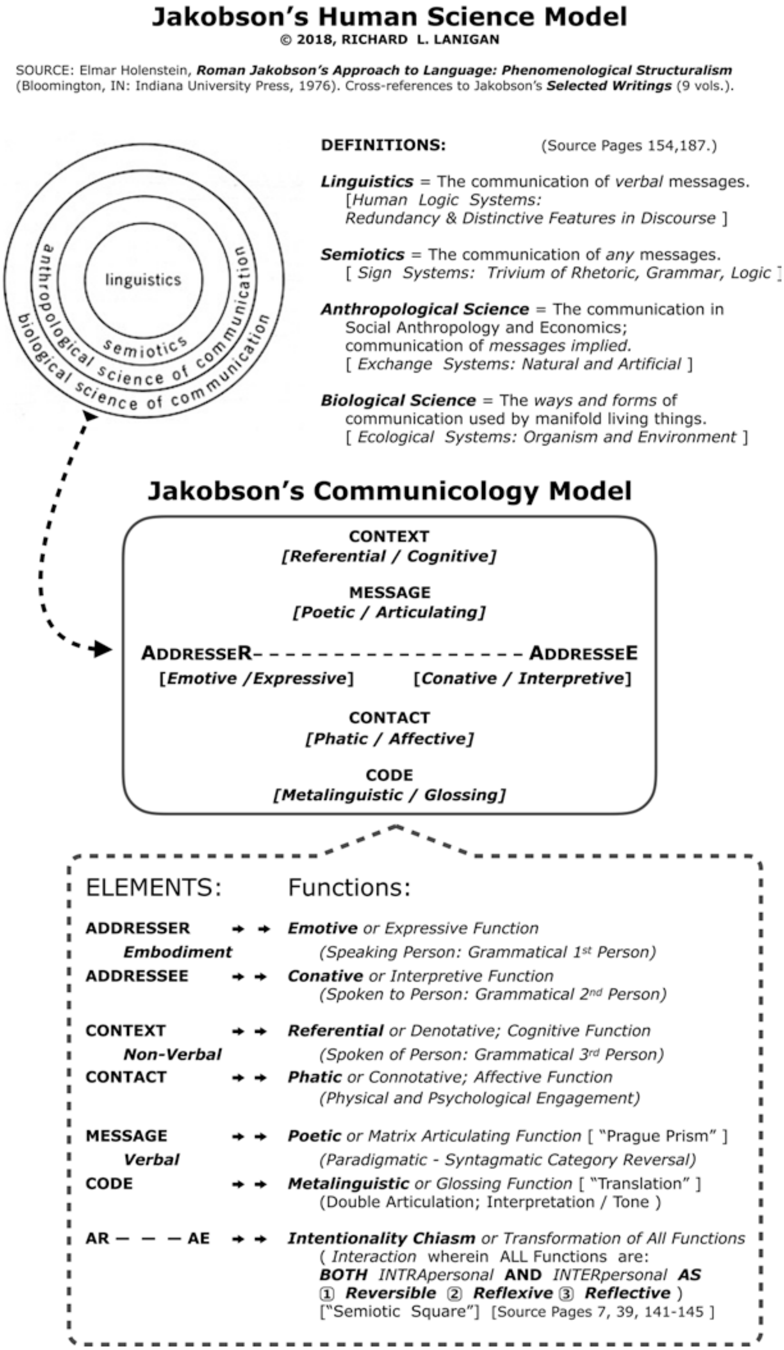


Fig. 8.1 Roman Jakobson communicology metatheory model

records this anthropological exchange principle as the third circle in Fig. 8.1. The outer, fourth circle represents *Biological* communication systems that *embody* one, two, or three functions of the previous levels.

Simply put, *human beings* embody all four levels: 4-Biologic (Organism/ Physical), 3-Anthropologic (Environment/ Physical), 2-Semiotic (Environment/ Mental), and 1-Linguistic (Organism/Mental). In this context, *animals* embody levels 4, 3 and 2; whereas, *machines* "embody" only level 3 (Environment/ Physical). On this foundation, my analysis proceeds to deconstruct the reductionist models that have progressed from bio-semiotics [levels 4-Biologic and 2-Semiotic], to socio-cybernetics [levels 3-Anthropologic and 2-Semiotic], and, to semio-cybernetics [levels 4-Biologic, 3-Anthrprologic, and 2-Semiotic]. All of these approaches contain two negative *reductions*: (1) the *elimination* of level 1-Linguistic (Organism/Mental), and, (2) the *elimination* of the combinatory hierarchy Logic [level 2-Semiotic] inherent in human languages (and, their secondary modeling as artificial "languages" [computers], or tertiary modeling as artificial "intelligences"[robotics]).

Let us begin with a visual suggestion of how to discover the presence of such misleading reductionist thinking. In Fig. 8.2, we have an illustration of how bio-semiotics imagines (a proposed reality) the actual world of living people. Such a representational model is achieved by eliminating the core 1-Linguistic level of analysis. When you do *not* do the reduction, you are able to perceive an actuality model of all four level of analysis as in Fig. 8.3.

At this juncture, we need to review just what is contained in the Jakobson model at level 1-Linguistic. Remember that this meta-system is itself a double articulated system so that the Human Science Model in Fig. 8.1, can be illustrated with Fig. 8.4. In parallel fashion, the linguistic hierarchy is the four levels suggested by Fig. 8.5.

Norbert Wiener (1948a, b) summarizes for us: "The chief value of language is not that it enriches communication, though it certainly does so, but that it puts communication into a form which is transferable without the physical presence of the objects it concerns. This leads to writing, in which it is no longer necessary to confront the participants in communication" (p. 219). Thus, it becomes obvious why it is popular to engage a reductionist approach to complex living systems by eliminating high order complexity (linguistic systems) in favor of non-complexity (organic/ inorganic objects). Getting rid of "language" allows the researcher to avoid *logic systems* that require problematic explication plus thematic explanation; an example is Maturana and Varela (1972/1980). Where *language is the foundational logic* used, the logic hierarchy in Fig. 8.5 thus constitutes a functional "control" function (decision matrix) over all four levels of derivative semiotic systems as suggested in Fig. 8.6; an example of this new perspective is Maturana and Varela (1987). This language criterion approach to analysis now requires that we revise the complexity level of our thinking and move by means of *abduction* from the simplicity of Fig. 8.3 (a linear reality model) to the complexity of Fig. 8.7 (a curvilinear actuality model).

The logic used to create the Fig. 8.7 illustration is summarized in Figs. 8.8 and 8.9 as traditional forms of causality (matter, form, agency, purpose). Figures 8.10, 8.11, 8.12, and 8.13 suggest the founding/constitutive *logic* that human *language*

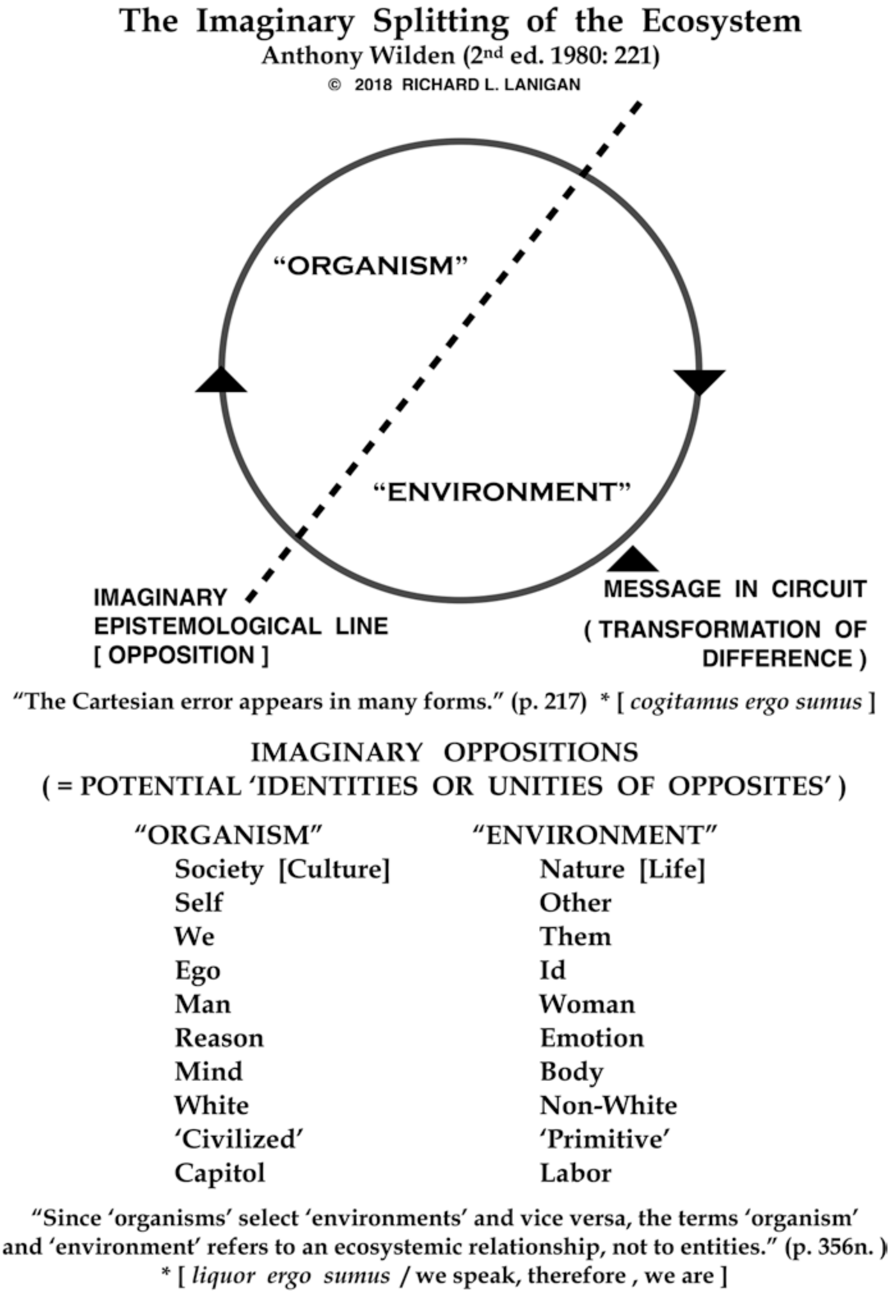


Fig. 8.2 Reductionist model of living systems (information theory)

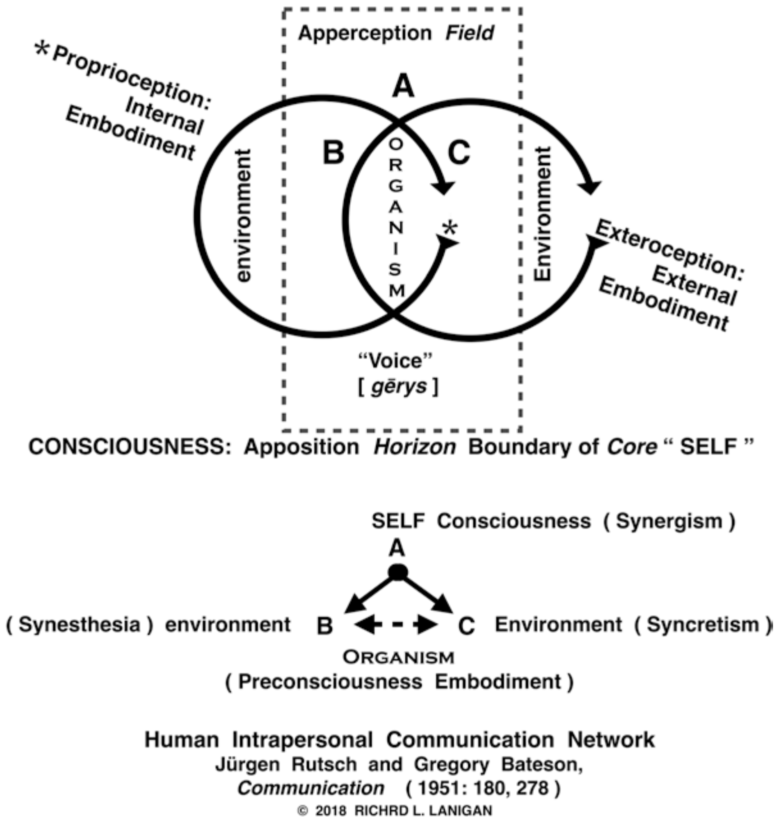


Fig. 8.3 Linguistic model of living systems (communication theory)

displays as a model of human *thought*. The figures constitute a metatheory specification of Roman Jakobson's communicology model in Fig. 8.1. The *chiasm tropic logic* in Fig. 8.11 is the rhetorical modality of Aristotle's syllogism of four terms in three proposition (the contemporary understanding of *triadic* relations as in C. S. Peirce and *quadratic* relations as in A. J. Greimas; discussed at length in Lanigan 2015b). A good example of the chiasm logic method (language based semiotics) is Maturana and Varela (1987: 26, 210) where their theoretical premise is the phenomenological combination of two chiasms: (1) "All doing is knowing, and all knowing is doing" and (2) "Everything said is said by someone". Note the precise tropic structure at work:

A: Doing-1	**B**: Knowing-1	**b**: Knowing-2	**a**: Doing-2
A: Everything	**B**: Said-1	**b**: Said-2	**a**: Someone

Figures 8.8 and 8.9 suggest the axioms that can be constituted by this phenomenon-of-logic approach to research. "We operate in language when an observer sees that the objects of our linguistic distinctions are elements of our linguistic domain.

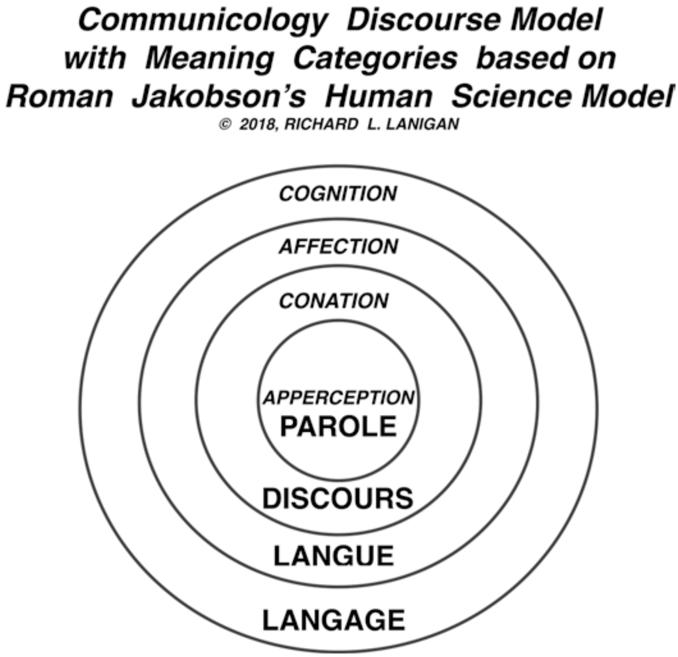


Fig. 8.4 Discourse model in communication theory

Language is an ongoing process that only exists as languaging [*sic* speaking], not as isolated items of behavior." Please note that this phenomenological perspective is a complete *reversal* of their 1972 phenomenalism wherein human communication was reduced to a closed system "autopoiesis machine" computer metaphor (Maturana and Varela 1974/1980: 78; my correction; see Nöth 2002, 2008; see Fig. 8.16).

Having positioned the hierarchy of combinatory, inclusion logic (Both/And) over the differential, exclusionary logic (Either/Or) [summarized in part 1 of Fig. 8.20], we are positioned to perceive the doubling of Jakobson's communicology model (Fig. 8.1) as the combined interpersonal communication dynamic (Fig. 8.7) of expression (Fig. 8.12) and perception (Fig. 8.13). Figure 8.14 presents the dynamic curvilinear process in linear static terms, whereas Fig. 8.15 illustrates the chiasm logic form.

8.3 Thematic: Cybernetic Communication Contextualizes Bio-Socio-Semiotic Information

The longstanding comparison of Culture and Nature was first posed in the West by the pre-socratic philosopher Parmenides and advocated by his "Successor" Proclus Lycaeus, who asks "One, how many?". This metaphysical question, a particular

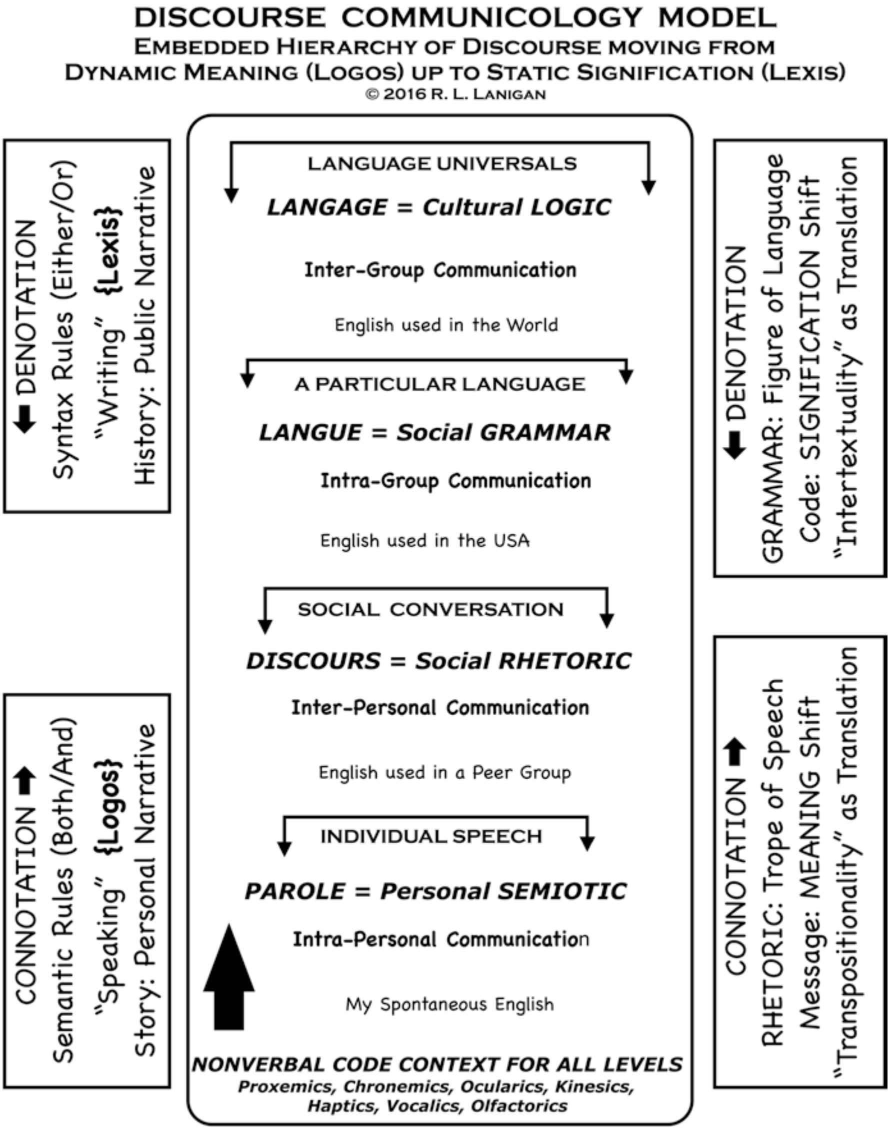


Fig. 8.5 Standard linguistic hierarchy for communicated language (speech)

lecture favorite of Charles Peirce and Gregory Bateson, creates a dialectic investigation procedure for how to do research which is named the *triás* method (triadic structure). The method investigates the relationship among three embodiment conditions: (1) the Unparticipated [*amethekton*] or what is *experienced*, (2) the Participated [*metechomenon*] or who is the *experiencer*, and (3) the Participating [*metechon*] or how the *experiencing* occurs (Lanigan 2017). We know this method

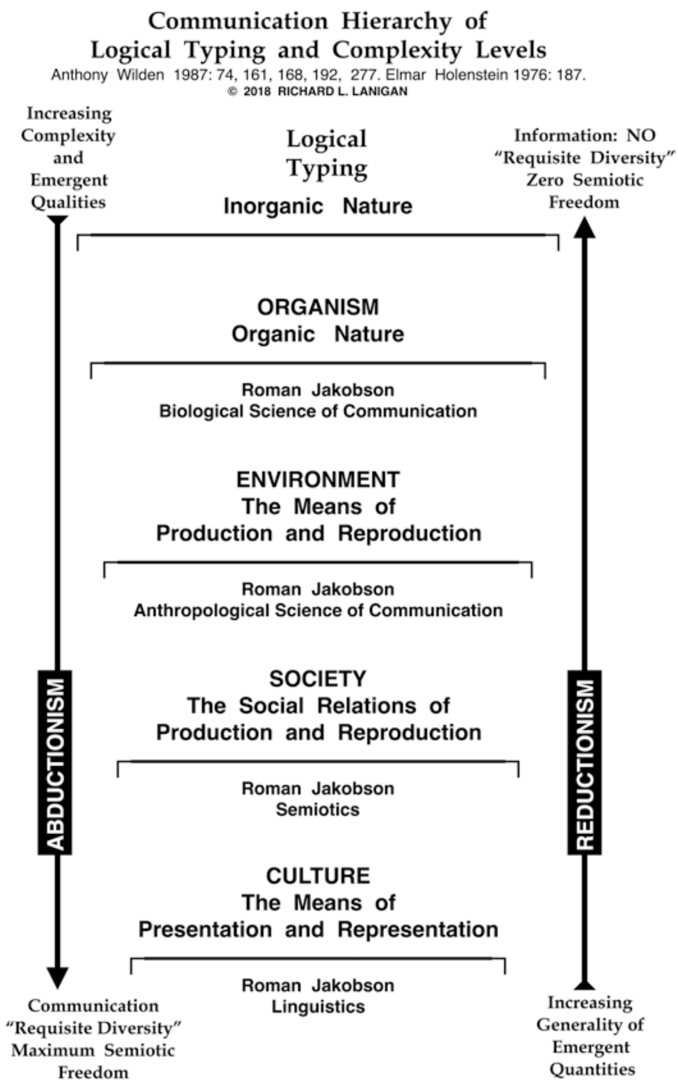


Fig. 8.6 Logical typing in human communication (compare Fig. 8.3)

primarily through the Scholastic Trivium as Logic, Grammar, and Rhetoric. Of course, Peirce scholars know this triadic structure well as Icon, Index, and Symbol. But remember the fourth element of the system, the *embodied human being* who thinks, speaks, and writes (Peirce's Interpretant). Figure 8.16 illustrates the contemporary culture (phenomenology) versus nature (phenomenalism) comparison in methodological terms.

Made explicit by Aristotle, the *triás question* is the metaphysical status of Objectivity as *answered* by the rhetoric argument of Universality (Substance, Whole) contested by the dialectic argument of Particularity (Attribute, Part)

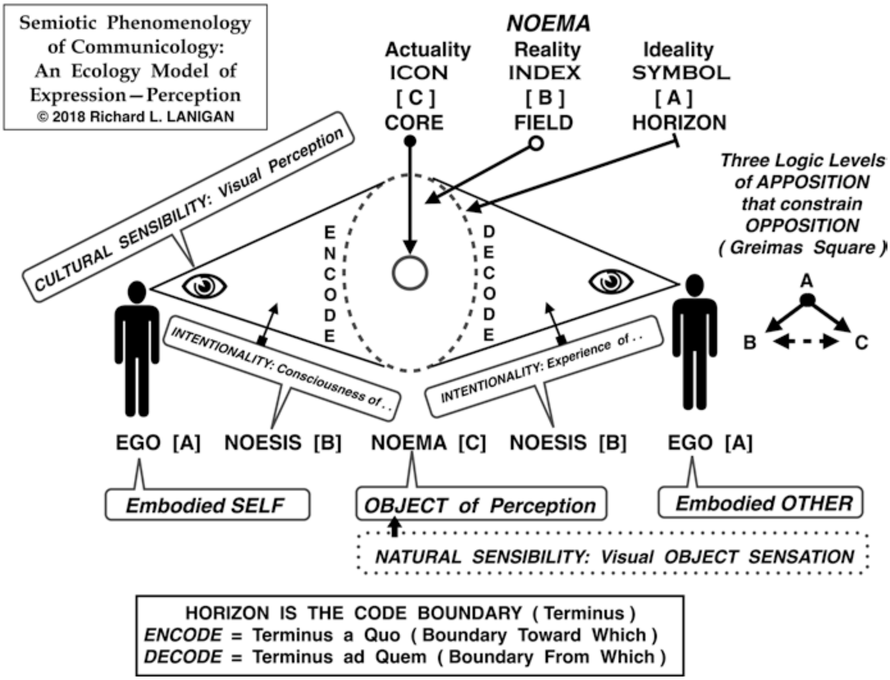
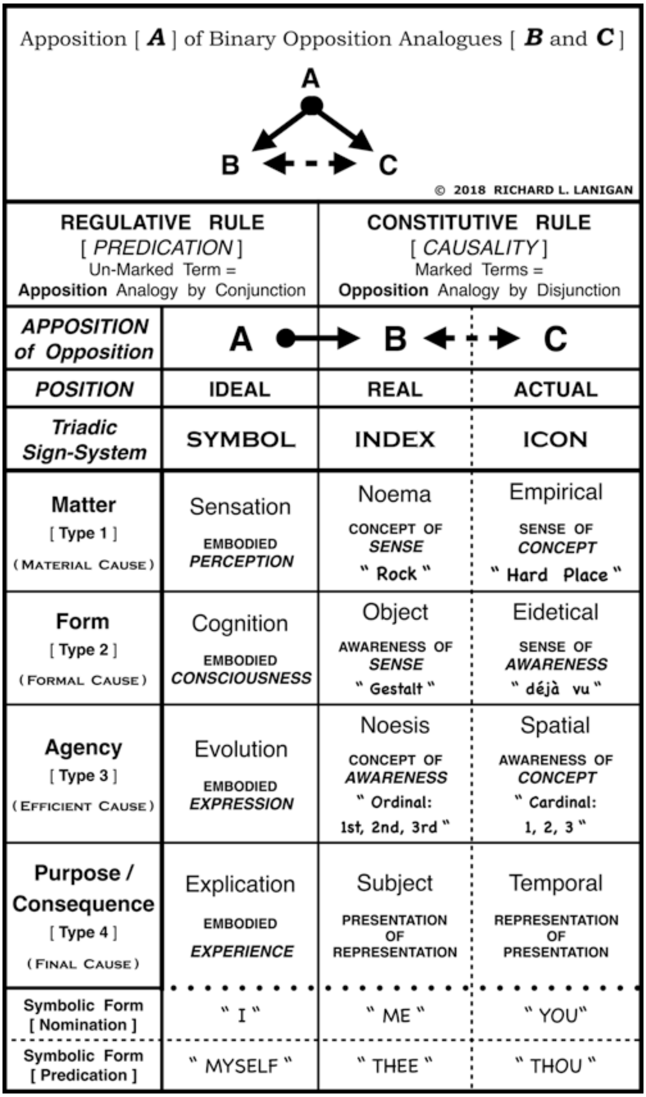


Fig. 8.7 Communication model of living systems (semiotic phenomenology theory)

(McKeon 1998, p. 153). The argument is refined by Immanuel Kant (Lanigan 2018a) and then confronted in the modern technological era by Ernst Cassirer with the human science concern for the idea of technology. For Cassirer (Lanigan 2018b), the question of Science (Objectivity) is the phenomenological contest between (1) the Perception of Objects (Appearances) and (2) the Perception of Expressions (Signs).

What has been lost among many contemporary semioticians is the classical distinction between (1) *sēmeion* [*fallible sign* as perceived = "real" to consciousness as "appearance"] and (2) *tekmérion* [*infallible sign* as expressed = "actual" to consciousness "object"]. The more familiar version of this distinction comes via grammar and its literature legacy (Shapiro 1988). This is to say, all "fallible sign" examples are "intransitive verb sentences", whereas all "infallible sign" examples are "transitive verb sentences". The very important point is that all *applied semiotics* (bio-semiotics, socio-semiotics, semio-cybernetics) assumes the description of Nature is self-referential [infallible sign] when in fact the description is other-referential [fallible sign]. Culture, description by language, constitutes the other-referential.

Thus, for human beings the condition of Culture for analysis is quite simply Charles S. Peirce's doctrines of *fallibilism* [*contingency*, knowledge is never absolute], *tychism* [*chance*, choice is never absolute], and *synechism* [*continuity*, the tendency to see *Gestalt* series] (Lanigan 2014). Culture as level 1-Linguistics



REGULATIVE RULE [*PREDICATION*] Un-Marked Term = **Apposition** Analogy by Conjunction		CONSTITUTIVE RULE [*CAUSALITY*] Marked Terms = **Opposition** Analogy by Disjunction	
APPOSITION of Opposition	A	B	C
POSITION	IDEAL	REAL	ACTUAL
Triadic Sign-System	SYMBOL	INDEX	ICON
Matter [Type 1] (MATERIAL CAUSE)	Sensation EMBODIED *PERCEPTION*	Noema CONCEPT OF *SENSE* " Rock "	Empirical SENSE OF *CONCEPT* " Hard Place "
Form [Type 2] (FORMAL CAUSE)	Cognition EMBODIED *CONSCIOUSNESS*	Object AWARENESS OF *SENSE* " Gestalt "	Eidetical SENSE OF *AWARENESS* " déjà vu "
Agency [Type 3] (EFFICIENT CAUSE)	Evolution EMBODIED *EXPRESSION*	Noesis CONCEPT OF *AWARENESS* " Ordinal: 1st, 2nd, 3rd "	Spatial AWARENESS OF *CONCEPT* " Cardinal: 1, 2, 3 "
Purpose / Consequence [Type 4] (FINAL CAUSE)	Explication EMBODIED *EXPERIENCE*	Subject PRESENTATION OF REPRESENTATION	Temporal REPRESENTATION OF PRESENTATION
Symbolic Form [Nomination]	" I "	" ME "	" YOU"
Symbolic Form [Predication]	" MYSELF "	" THEE "	" THOU "

Fig. 8.8 Apposition logic in terms of classical Aristotelian causality

precedes Nature as level 2-Semiotics. Figure 8.17 specifies the Culture to Nature hierarchy which then becomes the foundation for *adductive* logic. The result is a clear distinction between human open systems and machine closed systems. Furthermore in Fig. 8.18, we can see that the cybernetic *abduction* wherein *choice is a control factor* allows us to distinguish *goal-intended* **comportment** (open system; time function) from *goal-directed* **behavior** (closed system; space function). Our human ability to "sense" another person (apperception) and not confuse them

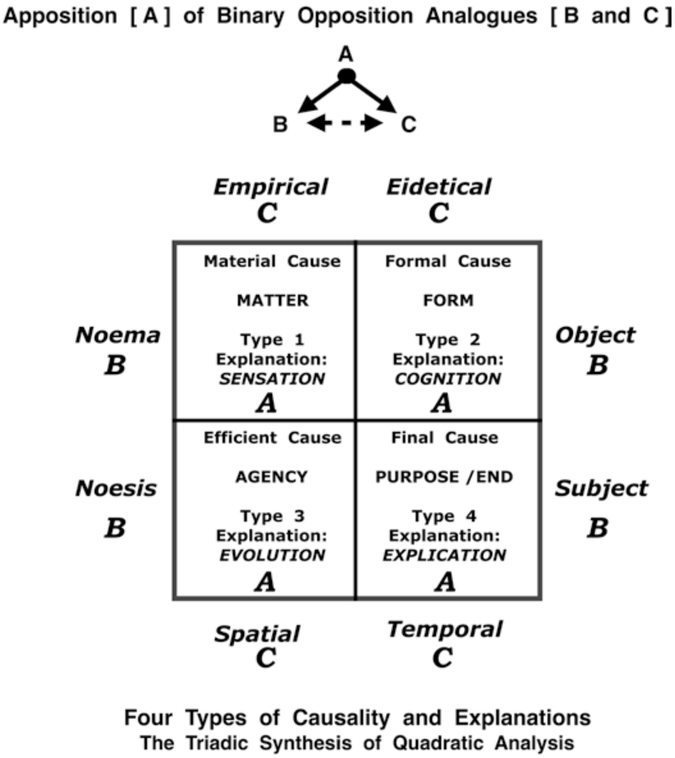


Fig. 8.9 Triadic semiotic relations illustrated as a semiotic square

(perception) with a robot (machine) is an everyday confirming experience (Dreyfus 1972/1992, 2001; Dreyfus and Dreyfus 1986; Lanigan 2018d). This fact is dramatically true when we think of our experience of speaking with another person versus our experience of a machine trying to communicate with us. We never confuse embodied speech (face-to-face; transaction) with its mechanical disembodied sound/ sight simulation (mobile phone; interaction). We should also note, as a matter of interest, that we humans never mistake perceived human action with either animal action or machine action during bodily movement.

Science cannot proceed on the basis of a “first and second order cybernetics” hypostatization and aporia where “language” is dismissed as *not part of* “observed description” [unparticipated]. The aporia, of course, is that even the biologist uses a human language and *that* available language *structure* gives the *logical* conception of description [participated] as embedded in a *rhetorical* expression of *meaning* [participating]. In short, definitive “subjective” judgment guides the “objective” description and account of “causality” [grammatical transitivity], long ago noted as a problematic for all of science by Otto Neurath (1944, p. 2). Even Norbert Wiener (1915, p. 570), echoing Peirce, famously says, “The life of every branch of mathematics lies in a habit.”

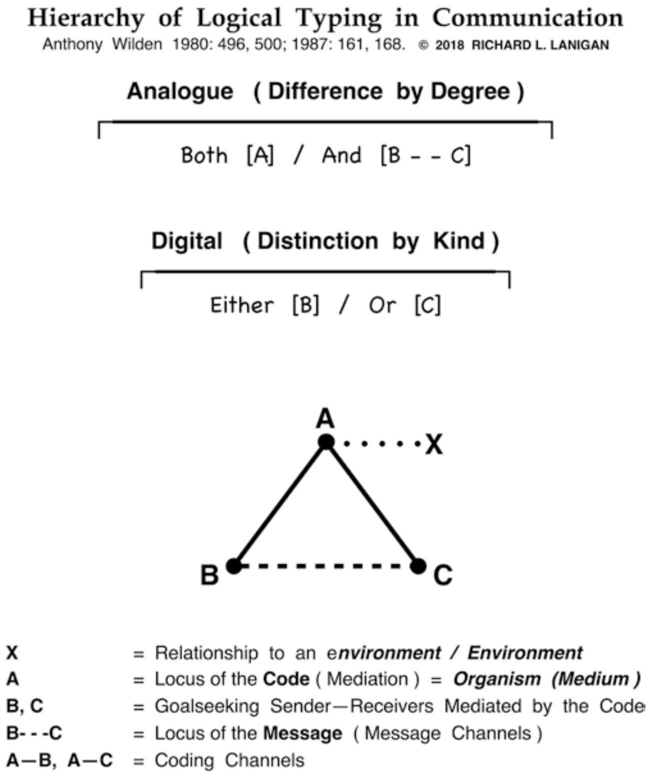


Fig. 8.10 The logic hierarchy of code and message as a chiasm ratio

As we need to note, semiotics as pseudo-science doctrine (bio-semiotics, socio-semiotics) proceeds by just such an "objectivist" hypostatization and aporia: "Is the biosemiotic approach reductionist? The answers of course yes—if one narrowly defines the words *signs* or *meaning* in terms of human phenomena such as linguistic symbols" (Hoffmeyer 2005/2008, p. 6; see Velmezova and Crowley 2015). A clever escape from the aporia is to assert that the thematic for judgment should not be "language", but "life". As Nöth (2015) summarizes Thomas A. Sebeok's biological (non-linguistic) approach to sign-systems:

> Sebeok's biosemiotics is not directed towards affirming the uniqueness of the human language faculty. In the debate between the essentialists and the evolutionists, in which we find biolinguistics generally taking the essentialist side, biosemioticians are usually found on the evolutionist side. The former argue that language is essentially "different from other forms of communication and that language separates humans from other species", whereas the latter postulate continuity in the growth of sign processes and systems. Furthermore, whereas biolinguistic research begins with the origin of language, the biosemiotic research program begins with the origin of life.
>
> For Sebeok, the semiotic threshold between the non-semiotic and semiotic world is the threshold between life and lifeless things. For him, that is a threshold between information and semiosis. In evolution before the origin of life we only find information (the ongoing increase in entropy), whereas semiosis begins with the origin of life (p. 159).

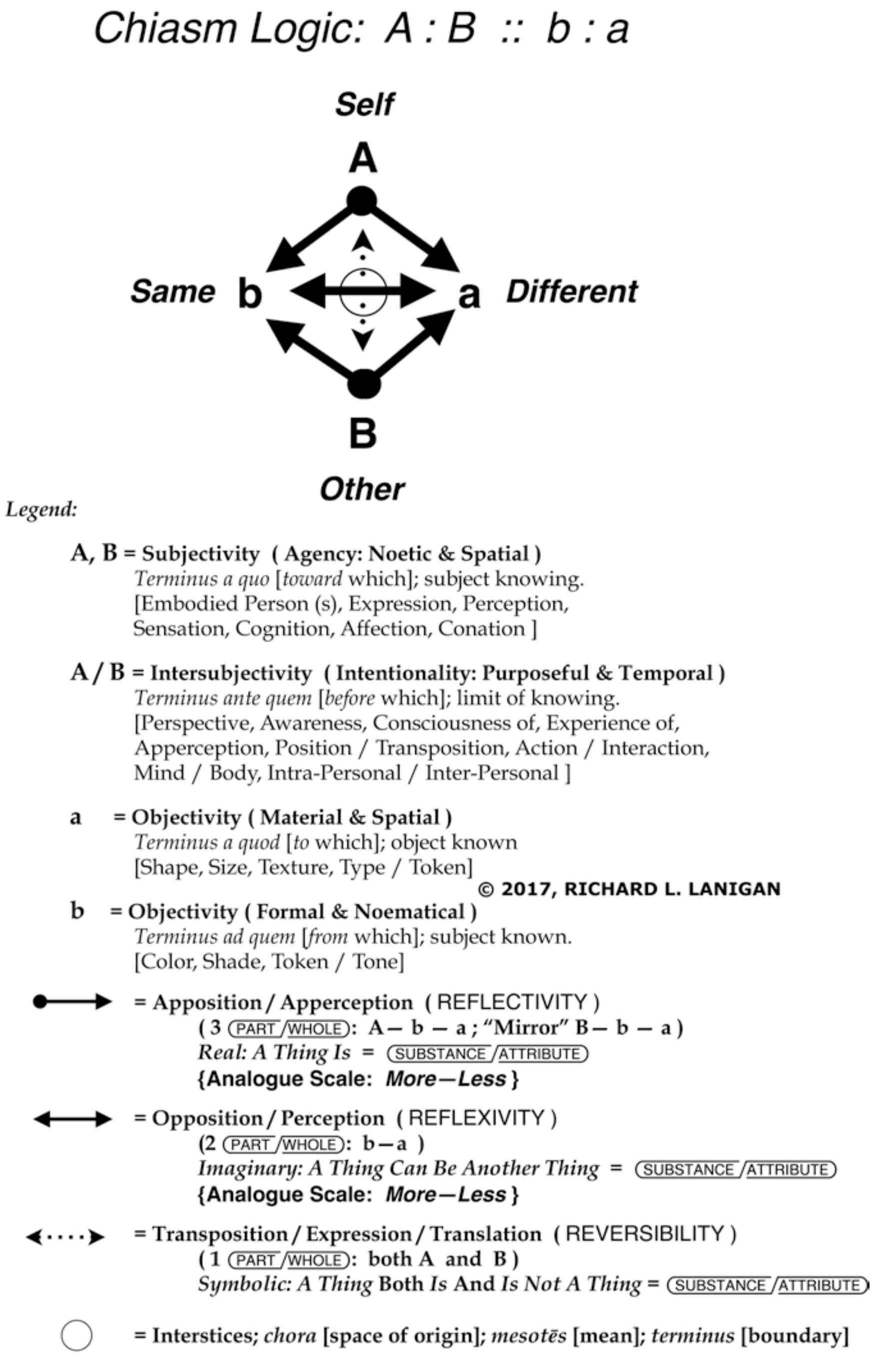


Fig. 8.11 Chiasm logic model (le même et l'autre)

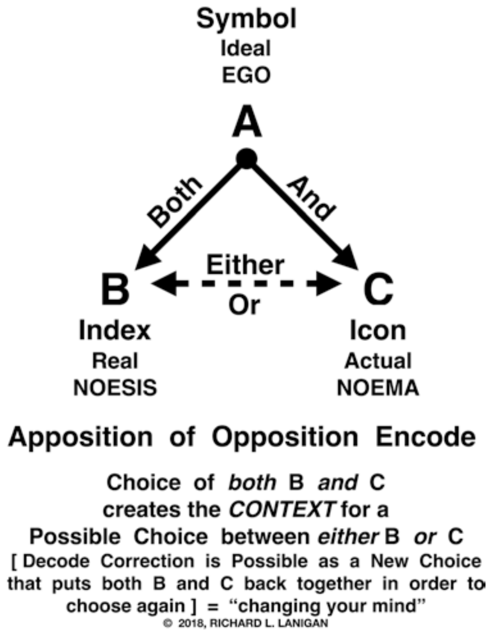


Fig. 8.12 Encoding in human communication (communication theory)

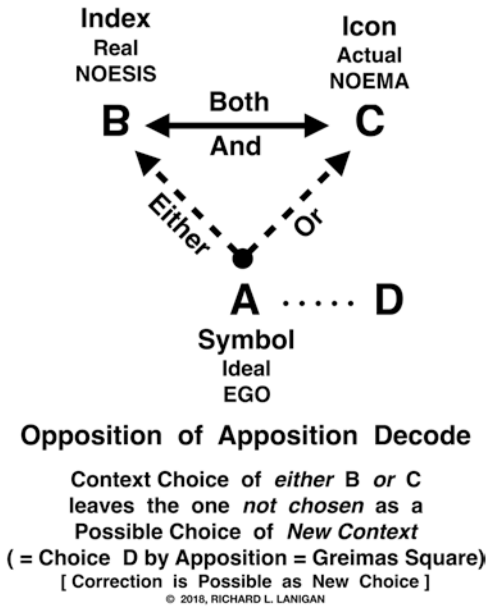


Fig. 8.13 Decoding in human communication (information theory)

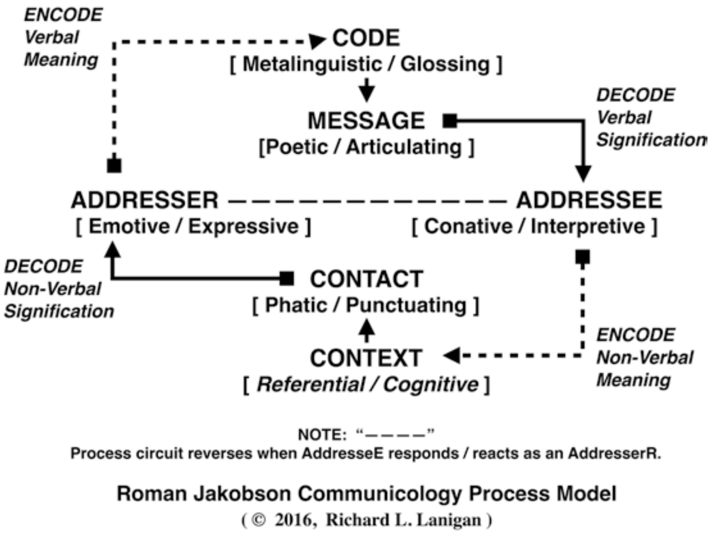


Fig. 8.14 The Jakobson process model of communication

Most of my analysis so far has been devoted to unpacking this "threshold" as an extraordinary example of the logical fallacy of "causality"—"after this, therefore because of this" [*post hoc ergo propter hoc*]. This is to say, the reported analysis *conflates* and confuses (1) the problematic (where we seek to locate the *present* source of "context", not *absent* "origin", (2) the thematic (where we seek to locate the *present* criterion of "choice", not the *absent* "not choice" of "information". Given Sebeok's *post hoc* thesis as described by Nöth, it is easy to understand why there is a proposal of a "semio-cybernetics". This proposal models on Information Theory (Informatics = semiotic syntax, no semantics nor pragmatics) and simply assumes that (1) a closed system "originates" [life is born = environment makes organism; neg-entropy], that (2) a closed system consumes, exhausts "energy" [life is dead = organism makes environment; entropy]; see Fig. 8.2. This point is a continuing issue in the discussion of the *Umwelt* model as proposed by von Uexküll (1937/2001; see Brentari 2011; Wheeler 2006) because the "origin of life" he suggests ends up making a theological claim for causality, unlike Darwin whose experiential claim is for adaptive rules (Kozintsev 2018).

Given the long tradition of Bateson and Wiener where cybernetics is integrated with the human sciences, we make more progress if we adopt the approach of Communication Theory (Third Order Cybernetics) and join the dialogue with Søren Brier (2008, 2009; Thellefsen et al. 2011). This synergistic approach alternatively assumes that (1) human beings make systems [life is process = Context: organism is environment; neg-entropy], that (2) an open system creates "energy" [life is apperception = Choice: environment is organism; entropy]. Heidegger's synoptic version is *Sein-zum-Tode* [being-toward-death]. His phenomenological model of semiotic choice of context [*Dasein*] is based on the Greek teleological concept of individual human existence [*tóde ti*] (Lanigan 2015d, 2016).

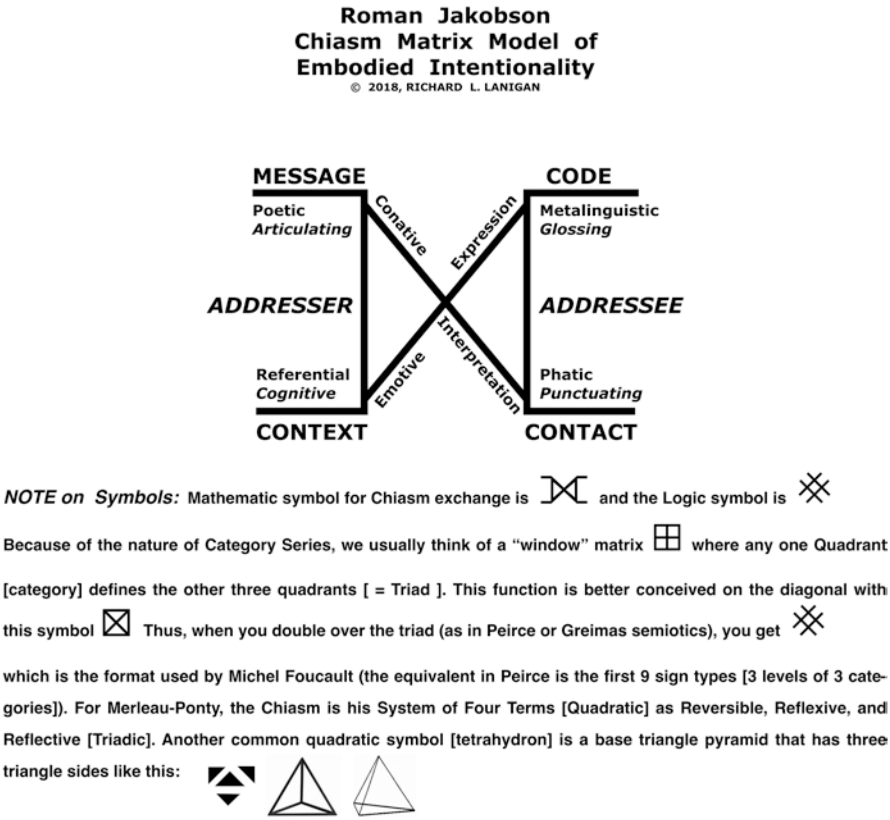


Fig. 8.15 Chiasm communicology matrix model

The challenge of our thematic comparison today centers on the *Gestalt* of *synergism* (phenomenology) and *antagonism* (positivism) of the Human and the Machine, that is, Communication Theory (where choice is *contingency*) and Information Theory (where choice is *uncertainty*). Of course, the "machine" is now a dead metaphor for the Nineteenth Century conception of "animal". This is to say bluntly, humans make machines, but machines cannot make a human being. Figure 8.20 provides a summary of the current status of our understanding of Communicology as the linguistic modeled sign-system that explains human comportment as a higher order system than those systems created by humans, i.e., machines with artificial languages and functions (Lanigan 1997, 2007, 2008, 2013, 2019; Ruesch and Bateson 1951; Ruesch and Kees 1972; Ruesch 1972, 1975). Figures 8.19 and 8.20 summarizes the key features of Communicology, defined by the method of semiotic phenomenology, that constitute a "third order" cybernetic model of human communication systems (speech/language) and all thought systems that derive from them (logic/mathematic) in concrete forms (Ashby 1956; Bateson 1972, 1979, 1991, 2005; Dreyfus 1972/1992, 2001; Dreyfus and Dreyfus 1986; Heims 1993; Wiener 1915, 1948a, b, 1950, 1953).

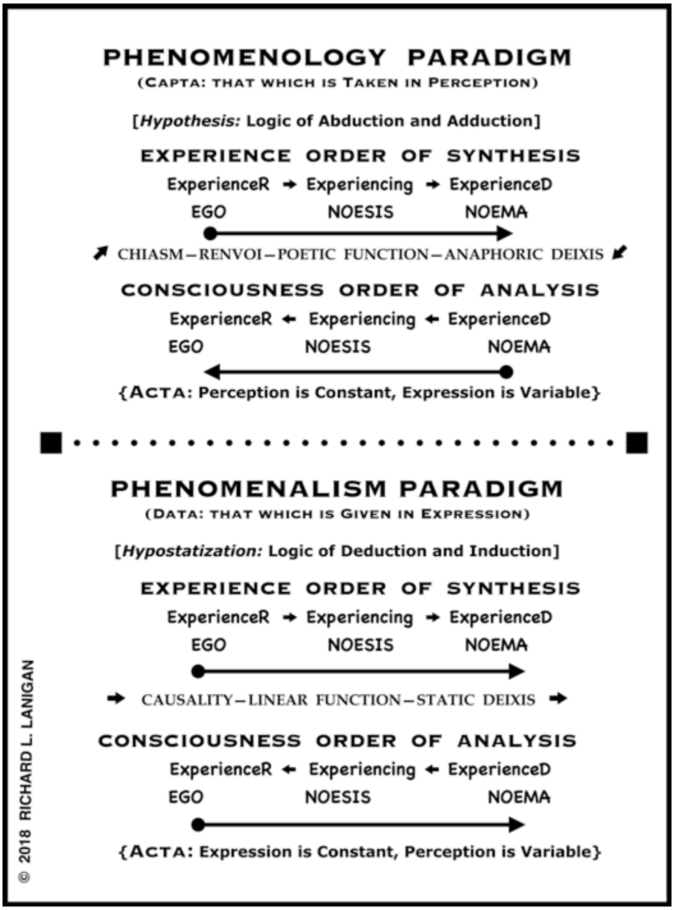


Fig. 8.16 Culture and nature methodology paradigms

8.4 Thematic: Semiotic Phenomenology Contextualizes Cybernetic Communication

My analysis suggests that Semiotic Phenomenology (contingency Choice-of-Context) already constitutes what is frequently named “Third Order Cybernetics”. Here, logic and semiotic are *normative systems* of conscious human experience (regulative rules in logic systems; rules/results). By comparison, the domain of “First Order Cybernetics” (machine systems) and “Second Order Cybernetics” (bio-social systems) is a reductive (Context-of-Choice uncertainty) of physical instrumentality (constitutive rules in logic systems; causes/effects). Here, logic and semiotic are *hypostatized systems* of “artificial intelligence” and “biological determinism” where observed action is a mere *analogy* for the cognitive *capacity* (Peirce’s sense) for choosing.

CYBERNETIC HYPOSTATIZATIONS	
Culture	**Nature**
Dynamic Process *APPERCEPTION* *(Bateson: Proprioception)*	Static Structure *PERCEPTION* *(Bateson: Exterooception)*
Open System	Closed System
Choice of Context (Analogue)	Context of Choice (Digital)
CODE *Regulates* Message Logic: Deduction	MESSAGE *Constitutes* Code Logic: Induction
CODE is CONJUNCTIVE Binary Logic: Both / And	MESSAGE is DISJUNCTIVE Binary Logic: Either / Or
Bio-Entropy	Physical-Entropy
Subjective / Inter-Subjective Gregory Bateson's *Creatura:* *Communication & Organization* *HUMAN SCIENCE*	Objective / Inter-Objective Gregory Bateson's *Pleroma:* *Information & Structuration* *PHYSICAL SCIENCE*
ORGANISM Embodies Environment	ENVIRONMENT Embodies Organism
Human Comportment { *Hexis* }	Human Behavior { *Habitus* }
Consciousness Function {*CAPTA*} (Times Makes Space) TERRITORY MAKES MAPS Ernst Cassirer's "Perception of Expression"	Brain Function {*DATA*} (Space Makes Time) MAP MAKES TERRITORIES Ernst Cassirer's "Perception of Objects"

CYBERNETIC ABDUCTIONS	
Richard L. Lanigan's *Communicology Theorem* Edmund Husserl's *Intentionality Theorem* Gregory Bateson's *Creatura Theorem*	
Communication Theory {Human} Open Binary Analogue: Both (Both / And) And (Either /Or)	
BOTH	*AND*
BOTH / AND	*EITHER / OR*
Information Theory {Machine} Closed Digital Binary: Either (Both / And) Or (Either /Or)	
EITHER	*OR*
BOTH / AND	*EITHER / OR*

Fig. 8.17 Cybernetic hypostatizations (second order) and abductions (third order)

In line with this analysis (Fig. 8.8), I further suggest that semiotic and logic are primarily synergistic (curvilinear conjunction), rather than antagonistic (linear disjunction). This is to say, the dynamic structure of human thinking is a *synergism* that begins with the usual triadic semiotic **A > C > B** which is the series apposition of **A**

Communicology: Binary Logics in Semiotic Phenomenology	
Communication Theory	**Information Theory**
TELEOLOGY	**TELEONOMY**
Goal Intended "Open System" "Living" Binary Analogue Logic BOTH / AND CONJUNCTION	**Goal Directed** "Closed System" "Dying" ⊗ Binary Digital Logic EITHER / OR DISJUNCTION
In - Determinate Tranformation. Structure, Element, Disposition, Intention	**Over - Determinate** Formation, Form, Function Operation, Purpose
Pre - Conscious *COGNITION* Consciousness of - - - Comportment, Conviction (Kant), Purpose / Intentional, Subjects / Ideas Desires, *EXPLICATIONS*	Un - Conscious ⊠ *SENSATION* Experience of - - - Behavior, Persuasion (Kant) Decision / Unintentional, Objects / Things Powers, *EXPLANATIONS*
Aware of Change "Negative Entropy" "Living Ecology"	Un-Aware of Change "Positive Entropy" "Dying Ecology"
Regulative Rule "Rules Are NO Game"	Constitutive Rule "Rules Are A Game"
Necessary Condition	Sufficient Condition
Transcendent { Sign } (*In Absentia*)	**Immanent** { Symbol } (*In Presentia*)
Choice Of Context "Open System" *RHETORIC TROPE & SEMIOTIC SQUARE*	Context Of Choice "Closed System" ⊠ *GRAMMAR FIGURE & LOGIC SQUARE*
METAPHOR { SIMILE } "Transformations and Formations" ***QUALITY*** (Logical Extensions)	**METONYMY { SYNECDOCHE]** "Parts and Wholes" ***QUANTITY*** (Logical Intensions)
Distinction "Identification"	**Difference** "Differentiation"
Terminus A Quo "Toward the Boundary" (Subject Knowing) → I >○	Terminus Ad Quem "From the Boundary" (Subject Known) I → ⊙
Paradigm Example: *Road Vehicle* *RULES:* 1 - Enter, 2 - Drive, 3 - Exit Alternative Form: "Driver chooses number of Vehicle Axels" [Pays *Variable* Tax]	Paradigm Example: *Building Elevator* *RULES:* 1 - Enter, 2 - Ride, 3 - Exit Alternative Form: "Self-Driving Vehicle" [Pays *Fixed* Tax]

Fig. 8.18 Communication control: teleology and teleonomy

[Peircian Thirdness] to the binary pair **C** [Peircian Firstness] and **B** [Peircian Secondness]. These relations are illustrated in Figs. 8.11, 8.12 and 8.13 and discussed in Peircian rhetorical terms by Shapiro (1988).

NORBERT WIENER, GREGORY BATESON & ROMAN JAKOBSON ON COMMUNICOLOGY					
CYBERNETIC ORDER	SYSTEM STATE	METONYMIC ORDER (Series)	METAPHORIC ORDER (Blanks)	REDUNDANT FEATURE	DISTINCTIVE FEATURE
1 *INFORMATION THEORY*	LINEAR CLOSED	Summativity of Parts (Entropy) [Dis-Order]	SUBTRACTIVE REDUCTION −1 Choice = Context REDUCTION	PHENOMENAL DESCRIPTION SIGNIFICATION = Code Unit (Message Sense)	ABSENCE—ABSENCE (Opposition) [Digital Polar]
2 *COMMUNICATION THEORY*	CURVI— LINEAR OPEN	NON— Summativity of Parts (Neg-Entropy) [Order]	ADDATIVE SYNCRETISM +1 Choice = Context EXPANSION	SEMIO—LOGICAL EVALUATION MEANING = System-Code (Message Reference)	PRESENCE—ABSENCE (Apposition) [Binary Analogue]
3 *COMMUNICOLOGY THEORY* © 2019, RICHARD L. LANIGAN	GEOMETRIC BOUNDARY SYNERGISTIC GESTALT	GREATER THAN Summativity of Parts (Genesis) [*CHORA*]	CHIASM RATIO SYNERGISM A : B : : a : b	PHENOMENO—LOGICAL INTERPRETATION HUMAN COMMUNICATION = Embodiment-Code RUESCH & BATESON FOUR LEVELS MODEL INTRA-Person : INTER-Person : : INTRA-Group : INTER-Group	CHIASM PRESENT—ABSENCE ABSENT—PRESENCE (Transposition) [Trinary Quadratic Analogue]

Fig. 8.19 System summary for communication and information theories

When embodied in a living system *Gestalt*, the Semiotic Triad moves in *time* as well as space, producing a logic known as a *Helix* or binary analogue logic by *conjunction*. As such, the logic progresses in *space*, a Quadratic Logic **A > C > C > B** is produced as a *disjunction* (Hampden-Turner 1981: 148–151). In Roman Jakobson's model of communication theory there is both eidetic and empirical evidence that the Triadic Semiotic (Fig. 8.11) produces part of the synergism as *Distinctive Features*, while the Quadratic Logic (Fig. 8.21) produces part of the synergism as *Redundancy Features*. With Jakobson, the binary analogue of contingency (change; metaphor) precedes the digital binary of uncertainty reduction (entropy; metonymy). Figure 8.22 provides a summary of the types of application that communicology theory and method has in contemporary systems domains.

Jakobson's communicology model emerges clearly and consistently from the tradition of French Philosophy and Human Science as the synergism of the Triadic and Quadratic models. It is historically known as rhetorical or tropic logic [*Rhétorique générale*], but is currently best recognized by Maurice Merleau-Ponty's designation as *Chiasm*, usually symbolized as the ratio A: B: b: a, that is, a rhetorical model of the logic model call a syllogism: A > C > C > B. The key point here is that a *double articulation* at three levels [reflective, reflexive, reversible] is produced by the synergism such that *apposition* A (*Code*) generates a second *apposition* a (*Meta-Code*) in *time* and space that neither an animal nor a machine can produce (Lanigan 2018c). The simplest example of the human synergism is the use

LOGIC: Communicology vs. Informatics

HandChart © 2018, Richard L. Lanigan — International Communicology Institute

❶ Communicology Aspects of Communication and Information Theories

Communicology Theorem: **Communication Theory Entails** {is prior to}**Information Theory**
Plato: Collection *[synagōgḗ]* must precede a Division *[diaíresis]*. ***Edmund Husserl:*** *Noesis* precedes *Noema*.

Symbology > *Communication Theory Rule:* {Both [Both/And] And [Either/Or]}

Informatics > *Information Theory Rule:* {Either [Both/And] Or [Either/Or]}

Communication Logic Rule:	**Ab**duction	**(Particular; *a posteriori*)**	{Rule + Result = Case}
	Adduction	**(Universal; *a priori*)**	{Rule + Result = Case}
Information Logic Rule:	**De**duction		{Rule + Case = Result}
	Induction		{Case + Result = Rule}

❷ Communication (Symbol) Theory →→ Information (Signal) Theory

1. Def: **Constitution of Intentionality** **Intentionality as present: "subjective"** = Perception of Expression (*Noesis; Sign*)	**1.** [counterpoint: re-constitution of intentionality as absent: "objective"] = Perception of Object (*Noema; Symbol*)
CYBERNETICS: [*kybernētēs:* steersman, governor; To Guide Human Comportment]	**FIRST ORDER** ("Machine Regulation") [*System* Co-ordination > Regulation > Control] *(Command and Control Systems Theory)*
THIRD ORDER ("Human Choice") [*Organism* Structure > Behavior > Development] (*Semiotic Phenomenology*) (*Phenomenological Semiotics*)	**SECOND ORDER** ("Social Organization") [*System* Integration > Learning > Evolution] (*Socio-Cybernetics; Bio-Semiotics*) (.*Semio-Cybernetics*)
2. Consciousness-of-Experience (*Medium and Meaning [Code]:* understanding judgment/comportment) { **Logic Step One: Rule ↓**}	**2.** Experience-of-Consciousness (*Channel and Signification [Message]:* explaining decision/behavior) { **Rule ↓**}
3. [counterpoint: construction of certainty]	**3.** Def: **Reduction of Uncertainty**
4. Choice of Context (Metaphor/Simile) { Eidetic: Jakobson's *"Distinctive Feature"* }	**4.** Context of Choice (Metonymy/Synecdoche) { Empirical: Jakobson's *"Redundancy Feature"* }
5. Analogue Logic **(Both/And)** { *Apposition > Triadic Analogue > Add* }	**5.** Digital Logic **(Either/Or)** { *Opposition > Binary Digital > Delete* }
6. Necessary Condition as Hypothesis [Motivation]	**6.** Sufficient Condition as Hypostatization [Causality]
7. Judgment by Theory Definition [Genus → Differentia] (tropic logic = rhetoric) { **Logic Step Two: + Result ↓**}	**7.** Judgment by Method Rule [Genus → Definiendum] (figurative logic = grammar) { **+ Case ↓**}
8. Linguistic Theory [Hjelmslev's *"Structure"*]	**8.** Mathematical Theory [Hjelmslev's *"Form"*]
9. Key Concept: *CODE* [*codex:* to choose] { **Logic Step Three: = Case** }	**9.** Key Concept: *MESSAGE* [*mittere:* to send] { **= Result** }
10. ***Theory Paradigm:*** *Contingency of Choice {Addition}*	**10.** ***Theory Paradigm:*** *Confinement of Context {Subtraction}*
Primary Dynamic Logic: John von Neuman (1944) Norbert Wiener (1948, 1950)	*Primary Static Logic:* Claude E. Shannon (1948) Warren Weaver (1949)
Secondary Cultural Application: Jürgen Ruesch & Gregory Bateson (1951) Ernst Cassirer (1923; 1953) Roman Jakobson (1958, 1960) Hubert G. Alexander (1967) Hubert L. Dreyfus (1972; 1992) Anthony Wilden (1972; 1987) Richard L.Lanigan (1988; 1992) Irl Carter (2011)	*Secondary Social Application:* W. Ross Ashby (1956) B. F. Skinner (1957) P. Watzlawick, Beavin, Jackson (1967) Niklas Luhmann (1970) Ralph E. Anderson & Irl Carter (1974) Heinz von Foerster (1949; 2002); Klaus Krippendorff (1979; 2009)

Fig. 8.20 Communicology (semiotic phenomenology) as third order cybernetics

Semiotic Phenomenology Logic **Edmund Husserl — Charles S. Peirce — Roman Jakobson — Gregory Bateson**			
Noesis *Consciousness of - - -* [Transcendent] { Present Absence }		**Noema** *Experience of - - -* [Immanent] { Absent Presence }	
Transformation →	Formation →	Transformation →	Formation
Rule (*ABduction*)	**Result** (*DEduction*)	**Case** (*INduction*)	**Rule** (*ADduction*)
Chiasm **A** ***[Synchronic]***	Chiasm **B** ***[Diachronic]***	Chiasm **b** ***[Syntagmatic]***	Chiasm **a** ***[Paradigmatic]***
Expression [*Ausdruck*]	**Presentation** [*Vorstellung*]	**Perception** [*Wahrnehmung*]	**Representation** [*Darstellung*]
Encode [*Signifying*] FRAME	**Code** [*Signified*] PRAGUE PRISM	**Decode** [*Signifying*] CROSS-HAIRS	**Message** [*Signified*] DOMAIN
Realism [Synthetic Order of Consciousness →]			
Representamen → ***[Metaphor]***	**Icon →**	**Index →**	**Symbol ↓** ***[Distinctive Feature]***
↑ Idealism [← Analytic Order of Experience] ↓			
↑ Interpretant ***[Metonymy]***	**← Icon**	**← Index**	**← Symbol** ***[Redundancy Feature]***
Gregory Bateson and Roman Jakobson Cybernetic Modeling			
Proto-Learning (Level I Dynamic) [Change in Context] { Level 0 = Stasis }	***Deutero-Learning*** (Level II Dynamic) [Change in Binary Choice] DESCRIPTION	***Trito-Learning*** (Level III Dynamic) [Change in Digital Context] TAUTOLOGY	***Tetrato-Learning*** (Level IV Dynamic) [Change in Binary Analogue Choice] EXPLANATION
Causal Formation of System Type **4** Explanation EXPLICATION ***FOUNDEDNESS [Fundierung] SYNERGISTIC OUTCOMES*** ***PHENOMENO-LOGICAL LOGIC***	***Mechanical Linkage Elements in Systems*** Type **1** Explanation DIRECT PERSPECTIVE ***ISOMETRIC Equal Outcomes*** ***PHENOMENAL LOGIC***	***Isomorphism of Systems*** Type **2** Explanation META- PERSPECTIVE ***ISOMORPHIC Similar Outcomes; Convergence of Different Outcomes*** ***TROPIC LOGIC***	***Transformation of Systems*** Type **3** Explanation META-META- PERSPECTIVE ***NEOMORPHIC New and Different Outcomes*** ***SEMIOTIC LOGIC***
Peirce Logic Definitions of Formation [Semiotic Models of Transformation = ***Synergism*****] :** 1. **ABduction:** Rule + Result = Case [Analytic, Particular, *a posteriori*, Centripetal] 2. **ADDuction:** Rule + Result = Case [Synthetic, Universal, *a priori*, Centrifugal] 3. **INduction:** Case + Result = Rule [Probability Measure = Contingency] 4. **DEduction:** Rule + Case = Result [Possibility Measure = Certainty] © 2017 R. L. LANIGAN			

Fig. 8.21 Summary of semiotic phenomenology logic

COMMUNICOLOGY: THEORY AND METHODOLOGY			
Methodology Experience Order of *Synthesis* 1 → 2 → 3 Conscious Order of *Analysis* 3 ← 2 ← 1	1 DESCRIPTION	2 REDUCTION	3 INTERPRETATION
Perspective	DIRECT	META—	META—META—
Phenomenology	Reflexivity	Reversibility	Reflectivity
Semiotic	Signification	Meaning	Understanding
Peirce's Logic Abduction /Adduction (Deduction) { Induction }	RULE (Rule) { Case }	RESULT (Case) { Result }	CASE (Result) { Rule }
Typology Change	First Order	Second Order	Third Order
Typology Modelling	Primary Modelling	Secondary Modelling	Tertiary Modelling
Ecology Explanatory System (Ecocommunication)	Type 1 Two Linked *Elements* as One System [Closed System]	Type 2 *Isomorphism* of Two Systems [Open System]	Type 3 [4] *Transformation* of Two Systems [as One Formation] [One Open System governing Two Closed Systems]
Game Theory [Abbarent Formation]	Rules Inside the System ["The Rules Are No Game" = Nip / Bite Paradox]	Rules Outside the System ["Player Choice Win Rule" = Termination]	Rules Combine Inside and Outside Systems ["Unlimited Semiosis"]
Exchange Theory (Axiom Rule) © 2017 R. L. LANIGAN	Information Theory (Either / Or Choice-in-Context) {Message Selection}	Communication Theory (Both / And Choice-of-Context) { Code Selection }	Communicology Theory [Both (Both / And) And (Either / Or)] { Choice of Context for Choosing } (Double Articulation of Code / Message)

Fig. 8.22 Applied systems analysis in communicology

Human Science of Communicology			
Phenomenological Method	***Description***	***Reduction***	***Interpretation***
Evidence	**Data** [Given]	**Capta** [Taken]	**Acta** [Action]
Theory Construction	**Theory** [Paradigm]	**Research** [Model]	**Application** [Prototype]
Small Group Culture	**Content-Ordered**	**Task-Ordered**	**Group-Ordered**
Cultural Semiotics	**Diffusion of Code** [***Iconicity***]	**Infusion of Code** [***Indexicality***]	**Communication of Code** [***Symbology***]
Cybernetic Typologies **Machine & Social Systems Theory**	**Isometric** **TYPE 1 Explanation** Mechanical Linkage of Elements Equal Outcomes	**Isomorphic** **TYPE 2 Explanation** Element Convergence in Systems Similar Outcomes; Convergence of Different Outcomes	**Neomorphic** **TYPE 3 Explanation** Transformation of Systems New and Different Outcomes; Synergisms (Type 4)
Charles S. Peirce SIGNS	OBJECT - - - - - - - ICON	GROUND - - - - - - - INDEX	INTERPRETANT - - - - - - - SYMBOL
SEMIOTIC SYSTEM (Three Levels of Normative Typology Abstraction) **Logic Complexity → Level**	**Saussure** [OPPOSITION] Sr ——— Sd	**Hjelmslev** [APPOSITION] [Sr] ——— Sr / Sd ———————— [Sd] ——— Sr / Sd	**Greimas** [TRANSPOSITION] Sr ⟷ Sd ↕ × ↕ Sr ⟷ Sd
Phenomenological Logic © 2017 R. L. LANIGAN	***Reflexivity*** [Sensation] {Ground}	***Reversibility*** [Perception] {Representamen}	***Reflectivity*** [Expression] {Interpretant}

Fig. 8.23 Semiotic domains of the human science of phenomenology

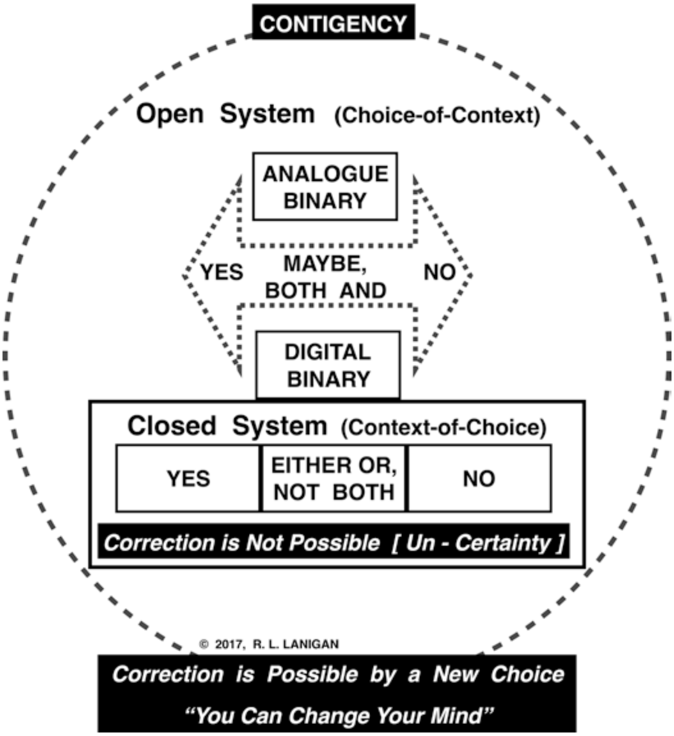


Fig. 8.24 The semiotic phenomenology of human choice and context as contingency

of *nonce signs,* which I have called *blanks* up to this point (following Husserl and Peirce). A blank or nonce-sign (Direct Perspective) is used to *present* (Meta-Perspective) the *absence* of an object (Meta-Meta-Perspective); we rhetorically short-hand the logic process of Description, Reduction, and Interpretation (Fig. 8.23) by saying "I have an *idea*". Umberto Eco makes the same analysis by defining semiotics as the "capacity to lie", which is to say to create a category *blank* to establish a relational *series* (Lanigan 1992, 2015b). Side comment example here, because reading [third level modeling] is so difficult with *blanks,* we invent fillers like *commas,* etc. to keep the harmony of the *series.* So, a "lie" is just shorthand for the conjunction of *series* and *blanks* that are an analogue logic [plus/minus; more/less = metaphor] that *constrains* a digital logic [zero/one; first/second = metonymy] (Nielson 2015; Pattee and Rączaszek-Leonardi 2012; Venancio 2017a, b). Finally, I should note that a fundamental part of Immanuel Kant's, Edmund Husserl's, and Charles S. Peirce's *phenomenology* is grounded in the nature of logic *series* and *blanks* and their *time/place* ["dash"] in human apperception (Comay and Ruda 2018). As depicted in Fig. 8.24, these philosophers came to see the chiasm that "phenomenology is the logic of embodied phenomena"–what has been appropriately called the abduction of "self-reference and re-entry" that we experience in human communication (Kaufman 2001, p. 102).

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Chapter 9
The Return of Philosophy: A Systemic Semiotics Approach

Berna Leticia Valle Canales

Abstract In this chapter, I review the nature of Systems Research to advance it as a way of doing complex and heterogeneous systems science. I examine semiotics and cybersemiotics as some of the thinking models that converge in systemics and describe the type of semiotic systems that can be studied with the Systems Research approach; as in the case of open systems and their transduction processes or semiosis. The representative systems of this kind comprise life and culture, yet, the study of society requires epistemic concepts of comprehensive scope, both philosophical and methodological, like the concepts in the cybersemiotic ontology and systemic-semiotic approaches. A brief comment on the relationship between systemic-semiotics and cybersemiotics is included in each section. Motivated by these ideas, the chapter's main tenet is to present a method to represent culture using network and graph models. The aim of this kind of representations is to understand how consciousness evolves within culture, in such a fashion that culture may be understood as an organism, as is postulated by cybersemiotics. Finally, the chapter closes with a discussion on the role of cybersemiotics and systemic-semiotics in the transdisciplinary thinking models, in particular within Systems Research.

Keywords Systemics · Philosophy · Semiotics · Information · Culture

9.1 Introduction

There is a consensus that establishes semiotics as the doctrine of all signs, but is there a parallel consensus within the science for Systems Research? Is Systems Research a science, a philosophy, or a methodology? What is the relationship between Systems Research, semiotics, and cybersemiotics? This chapter will elaborate on such inquiries in the following four sections. First, the section named "Is Systems Research a Paradigm?" offers a description of systemics as a fundamental change in the concepts and experimental practices for a number of scientific

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disciplines. We address the past 60 years as scientists have created new discourses about reality encompassing an integral, ecological, and holistic point of view, and following Thomas Kuhn's (1970) identification of the way in which the contemporary scientific worldview interconnects everything as a paradigm shift. In this sense, Systems Research is divided into three important categories: Systems Thinking, Systems Science, and Systems Engineering. Following this argument, the cybersemiotic approach serves as a Systems Thinking ontological foundation which studies consciousness. On the other hand, the systemic-semiotic approach is a foundation for Systems Science which studies semiosis.

The second part focuses on "Open Systems" and how a system is a point of view or a universe of discourse predefined by a reference frame. It consists of a set of general concepts conceived by humans as part of more or less identifiable patterns of coherence which are permanent in the real world (François 2004, p. 580). It is in this sense that the social sciences, the liberal arts, and the humanities are open systems. Social and cultural forces can change reality in many ways: energy into matter, matter into information, information into energy and matter, etc., in a process known as *transduction* by systemic-semiotics and cybersemiotics and which involves emerging properties occurring over non-living and living, intelligent systems (Laszlo 1987; Wilber 2001). Ashby (1961) described the transduction processes as transformation and exchange of variety. Other scholars, like Wiener (1954), Beer (1968, 1985), and Shannon (1948, 1949), suggested measuring this type of change within an information domain, and using entropy as a unit. Shannon stated that the goal of measuring entropy is to understand the actual state of a system. This section will also cover the interaction between systems with different amounts of variety, the transformation of matter, energy, and information within them, and how Ashby's law of requisite variety (1961) can be used to represent this type of changes. Separately, cybersemiotics tackles the problem through an interactive dynamic model between the universes of Peirce's phaneroscopy (Brier 2013).

A third section highlights "The Organization of Thought through Network Theory" and presents one of semiosis' main hypothesis: that intelligent systems organize ideas in network patterns which support entropy dissipation through an intricate interconnectivity, individual, and collective relations. Intelligent systems are networks fundamentally interconnected by semiotic organizations (Luhmann 1998). Thus, both the evolution and adaptation of cognitive subjects are actualized by semiosis because: (a) it habilitates the operations of consciousness which organizes pure, complicated, refined, sophisticated, accidental, etc. thoughts; (b) Intelligent systems could be understood as networks of semiotic systems networks, necessarily interconnected by semiosis; and (c) consequently, the systemic-semiotics' hypothesis postulates semiosis as its consciousness' unit of analysis.

Throughout this chapter, I will review the aspects of semiosis that enable an understanding as to why semiotics, semiosis, and cybersemiotics are part of the current epistemological foundations of Systems Research. Moreover, apart from whether specialists in the sciences of language and semiotics may or may not have reached a consensus, it is a fact that today's semiotics is part of the foundations of transdisciplinarity, systems sciences, systemics, and big-small sciences (Berg 2017);

all of these as components of Systems Research. Systems Research is a new way of doing science, sometimes called "postmodern" science, although in quite a different sense than the meaning of posmodernity in the liberal arts. The incorporation of semiotics and cybersemiotics as components of Systems Research occurred at a time when those disciplines were broadly fragmented and divided, in particular semiotics, and were confronted in open debate with formal linguistics. In other words, the rules of cooperation, and the consolidation of axioms and epistemic concepts about the processes of semiosis, surpassed a fragmented scientific community to such an extent that in some scientific circles it is often said that philosophy, its actions, and epistemic concepts, are extinct.

Transdisciplinarity, nonetheless, demonstrates how knowledge evolves for the benefit of intelligence in new environments. The inscription of semiotics within the foundations of Systems Science alongside meta-theories, meta-methodologies, ontology, epistemology, axiology, category theory, and praxiology, among others, situates it in its rightful position to answer a most important question: how and why do we signify reality? Semiotics, in the other hand, is the doctrine of all signs, and a sign is something that is in place of something else in any of its properties. This definition creates a path to understanding nature's randomness and poses the real phenomena as open problems. Under this view, semiotics integrates Charles Sanders Peirce pragmatic thinking and ideas. Then, Systems Research, cybersemiotics, and systemic-semiotics are very close to one another: cybersemiotics' scope is an important foundation of Systems Thinking because of its basis as a second-order cybernetics, rooted in human context and interest in intentionality, while a systemic-semiotics' scope is a foundation of Systems Science and is related to a first-order cybernetics.

9.2 Is Systems Research a Paradigm?

In semiotics research, there is an ongoing discussion as to whether cybersemiotics is a particular semiotics or a general semiotics framework. Its precedent and development come from biosemiotics, which was established in 1991 as a research area for general semiotics (Sebeok 1991), however, today it is considered a foundation of transdisciplinary research. Systems Research prevents cybersemiotics from being taken as a sub-area or discipline within language sciences. In this chapter, I consider that cybersemiotics is a discipline on its own right. I call this focus the systemic-semiotics approach in order to distinguish it from Umberto Eco's general and particular semiotics. Notwithstanding, there is a constant dialogue with cybersemiotics, because all theory needs a philosophical anchorage. The cybersemiotics ontology posits human consciousness as one of the foundations of evolution, thus, the ontological vision of all semiotics within Systems Research is that of an evolutionist perspective.

In the hard sciences, there are two ways of developing scientific knowledge: *big science* and *small science*. Berg (2017, p. 1504) provides notable examples of each.

Big science encompasses projects which cover multidimensional observations and have significant budgets, like the two Gravitational-Wave Observatories (LIGO), and the European Virgo interferometer. Both observatories separately observed the collision of two neutron stars in detail. According to Berg, these projects are the sum of decades of work and scientific experience. The detectors' observations gathered enough data to support several hypotheses and to produce new postulates within astronomy, physics, and other natural science disciplines. Thus, big science projects have clear objectives, stand on solid theoretical ground, and involve an exceptional group of researchers working on the supervision and improvement of the project.

Conversely, small science presents discoveries made through open-ended questions and hypotheses that have been developed within small or individual research groups, such as the theory of relativity, the Laser Interferometer Gravitational-Wave (LIGO) detectors, and theoretical concepts like black holes and neutron stars. All of these smaller but highly specialized discoveries constitute small science (Berg 2017, p. 1504). Systems Research is similar to transdisciplinary research inasmuch as it is achieved via clear research objectives and theoretical foundations that require a large group of experts or an immense body of knowledge, data, and diverse laboratory experiences. During the last several decades, scientists, philosophers, epistemologists, and those interested in the theory of knowledge, have identified transdisciplinarity as the common language across specialized scientific disciplines. Reality in each highly specialized scientific discipline had reached such a degree of complexity that an entire discipline had to be developed: Complexity Science, so as to integrate the discoveries in each discipline. This is what Systems Research, systemics, or transdisciplinarity really boil down to as new ways of thinking: sharing, contrasting, and communicating outcomes and experiences across specializations.

Complexity Sciences and the General Theory of Systems are the most widely known theory and methodology models in Systems Research, although there are new approaches like systems biology, systems medicine, systems psychology, and systems economics. Nonetheless, beyond Complex Sciences and Systems Theory, Systems Thinking praxis involves integrating theory and practice of scientific research. In the hard sciences, this refers to all of the practical efforts of creating holistic solutions to complex challenges. Systemics' concepts, principles, and methods are designed to integrate knowledge across the boundaries of traditional domains; that is, beyond the limits of small science. Nevertheless, different systemic approaches address different dimensions of complexity, be it social, technical, environmental, etc., and apply a gamut of frameworks, and widely varied techniques. For these reasons, there are contrasting terminologies across different domains of knowledge.

A systems' scales and taxonomies may seem to be similar, but research groups do not necessarily share the same principles that sustain each worldview, culture, and criteria (Singer et al. 2012). As a result, systems researchers find numerous subtle differences in each specialization. To tackle such difficulties, the International Council of System Engineering (INCOSE) and The International Society for the System Sciences (ISSS) have devoted themselves to the task of creating work groups dedicated to the generation of a common language for Systems Research. The International Federation of Systems Research (IFSR) acknowledges at least three categories to refer to Systemics' language: (1) Systems Thinking, (2) Systems Science, and (3) Systems Engineering. Systems Thinking is focused in "understanding systems in a human context, and establishing human interest and intentionality with systems" (Sillitto 2012, p. 532). Systems Science encompasses all the systemic theories; while, Systems Engineering deals with the "choices about how to create and adjust a new system or modify an existing one to the better achievement of a purpose" (Martin et al. 2012, p. 11.)

The IFSR group has developed a way to integrate these ideas into one single framework, producing the "Systems Praxis Framework Brochure" (Fig. 9.1) (Singer et al. 2012, p. 2). The brochure presents three levels: the first level, at the top, is dedicated to Systems Science, its foundations, theories, and representations; the second level, the actual Systems Thinking level, presents the correlation between Systems Science and its approaches to practice; and, finally, the third level corresponds to Systems Engineering, and incorporates the ways in which to adjust or modify research through *hard methods* and or *soft methods*.

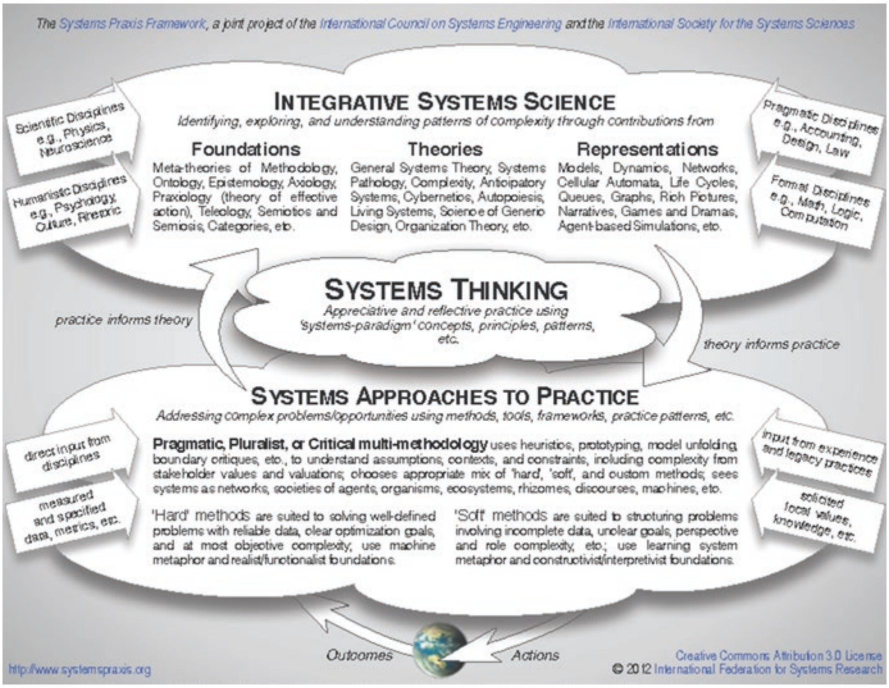

Fig. 9.1 The Systems Praxis Framework Brochure
Source: International Federation for Systems Research, released under Creative Commons Attribution 3.0 License. Credits: Diagram lead—Janet Singer, Narrative lead—Hillary Sillitto Team members—Johan Bendz, Gerhard Chroust, Duane Hybertson, Harold "Bud" Lawson, James Martin, Richard Martin, Michael Singer, Tatsumasa Takaku

The authors' classification of Systems Science into Foundations, Theories, and Representations is explained as follows: "Foundations help us to organize knowledge, learning, and discovery. Theories about systems allow us to identify patterns abstracted from and applicable across domains and specialties. Representations allow insight into, and communication about, systems and their contexts by describing, exploring, analyzing, making predictions, etc." (Singer et al. 2012, p. 2). One of the most important topics within Systems Research consists in ordering the varying hypotheses, representations, and theoretical concepts across Systems Science, Systems Thinking, and Systems Engineering. Among the approaches for organizing, learning, and discovering knowledge into Systems Science, there are meta-theories, meta-methodologies, ontology, epistemology, axiology, praxiology (or theory of effective action), teleology, semiotics and semiosis, category theory, among others. A brief outline of these frameworks is shown in Fig. 9.2 based on "The Objectives of the Foundations of Integrative Systems Science" contained in the *International Encyclopedia of Systems and Cybernetics* (François 2004) and its references.

A meta-theory focuses on the general principles of knowledge construction. These involve transdisciplinary research when objectives belong to differing theories (Blauberg et al. 1977). Meta-theories aim to be somehow isomorphic with respect to concrete systems, so as to be functional if its properties are suitable for the world. Peter Caws (1968) describes Systems Theory as a way of looking at systems, notwithstanding theories by themselves are systems as well. Upon studying a

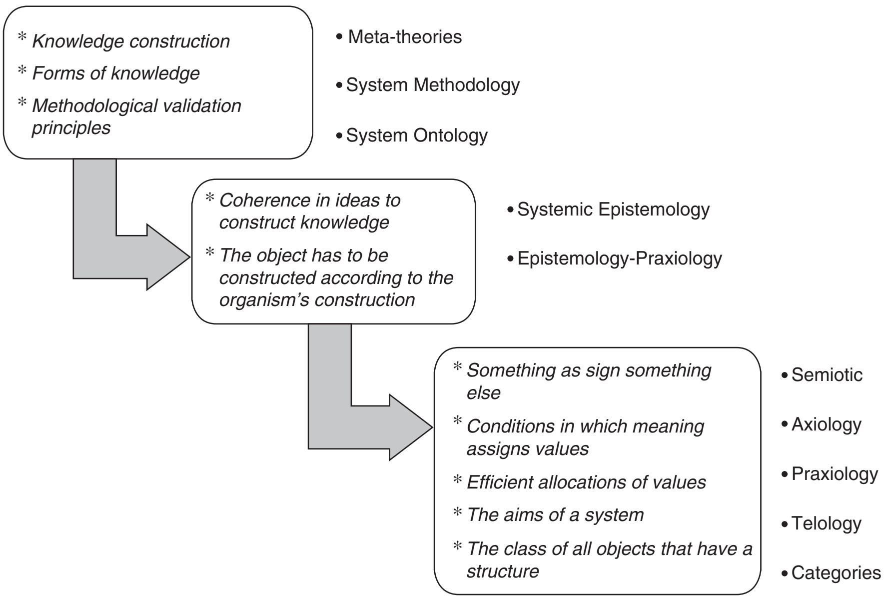

Fig. 9.2 The Objectives of the Foundations of Integrative Systems Science
Source: Author based on the "Systems Praxis Framework Brochure" (Singer et al. 2012)

system as a whole, this will look like a compound of parts related to one another through complex and dynamic relationships. In this sense, a meta-theory description of a system as a whole is similar to a cybersemiotics' idea —that of "feedback dynamics based on semiotic codes" (Brier 2009, p. 41). Caws (1968) indicates that the organizing function of theoretical arguments is to anticipate the behavior of physical systems: "If in theory the device blows up, in practice it had better not be built that way" (p. 3). The purpose of meta-theories is to find answers to the problems arising from changing the scale of observation in one discipline to another. There are those sciences where units of analysis and mechanical laws apply fully within their constitutive limits, such as cells; however, it is unintelligible to implement the same mechanical and statistical rules if the study comes from classical physics, quantum physics, or anthropology. Each change in the scale of observation involves different states of what are called *unit of analysis*, *identity*, and *limit*. Consequently, in each case, the meta-theories search for specific isomorphisms[1] "between the models of the respective discipline and the concrete systems." (François 2004, p. 377).

On the other hand, Systems Methodology refers to meta-methodology research, rather than to the construction knowledge. Meta-methodologies can compare particular methodologies between each other and "can be used to validate several methodological principles based on the methods already investigated" (Klir 1991, p. 106). Computers are the most convenient tools for carrying out this type of research, but there are several other meta-methodological tools in soft methods (Checkland 2000). In this context, cybersemiotics as a "transdisciplinary theory of signification and communication for living, human, social and technological systems" (Brier 2009, p. 28) is a type of meta-theory in Systems Thinking; while systemic-semiotics is a set of meta-methodologies in Systems Science.[2]

Systems Ontology implies a worldview and a hypothesis about the forms of knowledge Boscovich's conjecture (Boscovich 1758). This worldview is opposite to the classical science foundation, which has the firm belief that the possibilities of objectively observing nature are not the same as the possibilities of postulating something about the objective existence of nature. What is the difference between Systems Ontology and the classical point of view? The answer lies in the distinction between big science and small science. In the classical view, the ideas ascribe the absolute value of an object to the observed facts, without taking into consideration that phenomena are constructed through perceptual and conceptual filters, and according to human physiology and the brain's properties. Meanwhile, the central hypothesis of Systems Ontology establishes that humans coordinate, through sensory stimuli, mental structures of deep level within recurrent structures, which in return, are shallow mental structures. In this sense, whether or not these structures

[1] I understand isomorphisms as maps involving "a correspondence of elements from one to one, preserving the operational characteristics of the systems involved" (Beer 1968, p. 108). Stafford Beer (1968, 1985) illustrates that the result of an operation in the elements of a set of variety of states corresponds to the result of the similar process in their counterparts of another group.

[2] For Umberto Eco, a semiotic system is a structure (1976).

are remarkably ontological cannot be proved. The hypothesis assumes confirmation comes from individual data occurring frequently and adequately in human experience, and so, invariant co-occurrences or covariances can be established (Boscovich 1758; Fischer 1991, p. 96; Glasersfeld 1988, p. 13).

Opposite to Systems Ontology, cybersemiotics ontology tries to avoid this reductionist worldview. Cybersemiotics proposes a third non-reductionist path for knowledge production, one with a scope seeking to understand the role of consciousness within nature and culture. Søren Brier (2013) introduces such a path with this question: "What is the role of consciousness, signs and meaning in the development of our knowledge about evolution?" (p. 220). But before this question can be answered, it is important to distinguish the non-deterministic scope of second order cybernetics (Bateson 1972), and systems' probabilistic evolution (Prigogine 1993). Ilya Prigogine proposed that matter and energy are transformed from a trajectory which starts at a microscopic and unstable level; then it evolves into an irreducibly statistic level, by which a rupture of the temporal symmetry takes place; that is, once it enters this state, it cannot be reduced to its initial components. At the macroscopic level, energy and matter find a balance, and the final result is irreversible (Prigogine 1993). This succession from instability (chaos) → probability → irreversibility involves properties of probabilistic evolution that can be measured. Currently, within the culture dimension, these probabilistic and non-deterministic phenomena can be observed through virtual environments and their probabilistic evolution, as in networks topology. This entails the formalization of social phenomena, a cybersemiotic non-reductionist basis, and a systemic-semiotic methodology aimed toward probabilistic evolutions.

Another example in this area is Geoffrey West's *Scale* (2017). In his work, the author presents the essential application of these ideas within the Complex Sciences' framework and the Universal Laws of Growth. West demonstrates the use of allometric systems, from network theory and statistical structures of power laws, his attempt being the quest for scale invariance (co-occurrence). He is currently leading the way towards covariance across all dimensions, as Schrödinger suggested some decades ago (Schrödinger 1992). Furthermore, in Systemic Epistemology, it is important to say it embraces the meta-theory and Systems Ontology perspectives, although it has not developed into the macroscales of cybersemiotics. Thereby, Systemic Epistemology includes research instruments used to discover coherence and organization in the ideas that "emerge while constructing knowledge, models, and particular orientations of these approaches" (Kargl 1991, p. 580). Epistemology is an activity which examines facts and turns the gaze back to the observer to compare perspectives. In addition, Vallée (1987) articulates an epistemo–praxeology to emphasize subjectivity over objectivity, without excluding the latter entirely. The "interaction between subjective and objectiveness reduces substantially the efforts of meta-theories to achieve radical reductions" (p. 45–46). It is important to emphasize that, whether the knowledge process subjectivizes or objectifies the research process, this does not diminish the chances of reaching a reduction of qualities within the concrete system. The coherence of knowledge and types of knowledge depends on the organism's subjective experience.

In this sense, the intersubjective and subjective concepts of cybersemiotics and systemic-semiotics are very similar. Intersubjective interactions have limits across multiple spheres of knowledge, but have their bases in individual experience, although Systems Research has more radical constructivist approaches. An object has to be the product of an organism's construction regardless of whether it is believed that its concept corresponds to a thing-in-itself, existing "out there independent of any organism's experience" (Glasersfeld 1976, p. 116). Even if we do believe that perception is the mere replication of an objective world, we cannot consider the concept of an object as simply given, because the organism's sensory experience of the object will never be the same twice. There can be no object until we coordinate several experiences of it, thus constructing an invariant concept of the object (Glasersfeld 1976).

How does the objective world depend on sensory experience? Peirce's phenomenology of experience addresses the discussion of objectivity, subjectivity, and its effects over the development of science; systemic-semiotics and cybersemiotics follows suit. Peirce's semiotics proposes that something may be built and stand for something else through experience and demonstrates that a sign is determined by a real object which generates an experience in the brain, and an idea in the mind serving as an *interpretant sign* (Peirce 1931). But *interpretant signs* can only be known through other signs, because a sign cannot function by itself, it needs a mind to be interpreted as such. In this sense, meaning emerges from this interaction between thoughts and objects using signs. *Interpretant signs* provide evidence for the existence of other minds. Meanwhile, culture supplies a third kind of sign to communicate the meaning of the *interpretant*: a vehicle which expresses *interpretant signs* known as *representamen sign*. This process necessitates at least three entities and two or more links, as shown in Fig. 9.3.

The components which determine a semiotic representation have a special relation of matter (m), energy (e), and information (i). "Current state of affairs" or *objects* correspond to the magnitude of matter m. *Interpretant signs* are based on neurochemical reactions which generate, store, and discern *objects* in the brain, corresponding to the level of energy e and its relations to matter m. Culture and society construct conventional elements to represent the relation between objects and

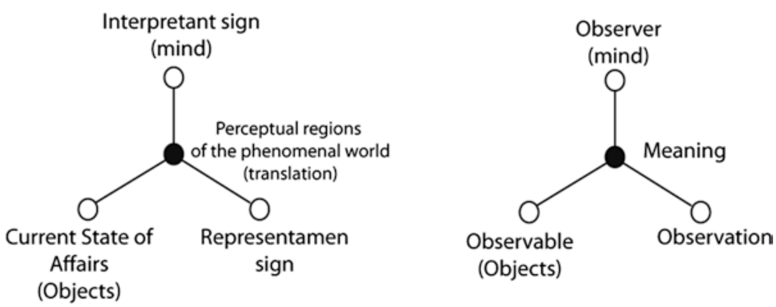

Fig. 9.3 Components determining a semiotic representation
Source: Author, based on Charles Sanders Peirce's triadic relations

interpretants, called representamen signs and they correspond to the magnitude of information, which emerges from matter and energy. Peirce (2012) developed semiotics in the nineteenth century, defining it as the necessary laws of signs. Independently, Ferdinand de Saussure (2011), at the beginning of the twentieth century, proposed the term "semiology" as the science of signs or the study of what happens when humankind tries to signify thought using necessary conventions. While semiotics studies all types of representations and systems of meaning, linguistics only studies to systems of verbal communication or languages. Linguistics' models cannot explain the processes of meaning generation within particular cultures because they are limited to the description of the rules and words that conform the grammar of natural languages. This is one of the reasons for which Systems Sciences resorts to semiotics as part of the foundations for its epistemic interpretations.

Semiotics is predicated on the idea of signs as the interaction of four entities: (1) real-world objects; (2) individuals' experiences in the real world; (3); interaction between self and signs; and (4) signs encoded in the minds of these individuals through vehicle signs with which individuals generate and communicate meaning amongst them—such that signs operate in an intersubjective or the cultural level. LaCalle (2001) conceives the fourth entity a socio–semiotic concept which enables a level of visualization of what is singularity across private and public spheres, as shown in Table 9.1.

In this sense, semiotic representations emerge as the result of the interaction of these levels:

> … [a] sign, or representamen, is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call interpretant of the first sign. The sign stands for something, its object. It stands for that object, not in all respects, but in reference to a sort of idea, which I have sometimes called the ground of representation (Peirce 1974, p. 135).

The relations between object, interpretant and representamen are understood as the triadic model of the sign. Peirce's principles establish icons, indexes, or symbols as kinds of signs in the following way: (I) an icon is a sign that resembles something else based in similar material properties; such as a portrait or a photography can resemble a person; (II) an index serves as a sign to indicate other things, in the

Table 9.1 Micro-universe: four entities needed for the assembly of signs

Visibility within cultural relations	Concrete objects (1)	Foundation or ground (2)	Interpretant signs (3)	Representamen signs (4)
Private	States of things of the micro-universe	Individual experience	Interaction between self and signs	Signs encoded in the electrochemical visual memory
Public	States of things of the macro universe	Interaction between objects of the concrete world	Semiotic systems Symbols	A mind encoding and decoding limits

manner in which an idea is associated to the potential or causal form of an object, as the sight of a type of cloud is associated to the possibility of a storm; (III) a symbol is a social agreement that something will be in place of something else, independently of pre-existing iconic or indexical relationships—for example, words in natural languages, the dance of bees, birds' sonation systems, the pheromones plants use to attract insects for pollination, or writing systems (Guddemi 2000; Hoeschele and Fitch 2016; Spierings et al. 2016; Kuenen and Gilbert 2014; Kuenen et al. 2014; Dakin et al. 2016).

For Peirce, there are three ways in which objects can be or exist in experience: *firstness*, *secondness*, and *thirdness*. "Firstness corresponds to the positive quality" of the possibility of becoming; the first time that a conscious brain experiences something. "Secondness corresponds to the current facts"; it is the action of memory when it identifies an activity from past knowledge and experiences. Finally, "thirdness corresponds to the laws governing cultural circumstances"; it is the common knowledge over actions without the constraints of the distant or immediate past (Peirce 1974, p. 171–286). These are the three primary categories of Peircean thinking. However, if a sign is circulating in social interaction, its behavior, meaning, and semiosis change dramatically. There are instances in which a sign does not mean anything. For example, the aim of a work of art is not to communicate something or to be the formal equivalent of something else. According to John Dewey (1980), art is pure experience or firstness, which means the intention of this kind of code is expressive and not communicative. Cybersemiotics considers firstness as the first state of consciousness and Niklas Luhmann named it "first autopoiesis". In both theories, this level depends on the biophysical and psychological barriers of the individual (Brier 2013; Luhmann 1995).

Alternatively, systemic-semiotics is based on the first-order cybernetics definitions by Phillip Guddemi (2000). Guddemi explains that the evolution of the concept *sign* is associated with Peirce's phenomenology of experience and associates the construction of signs with Maturana's (2002) *structural coupling*, which is a path which enables the evolution of categories of experience: from pure experience or firstness, towards second experience or secondness, to the third category, or thirdness. In cybersemiotics, firstness is everything which expresses something as a level of consciousness, and which habilitates the capacity to distinguish the objective of communication from its medium. Secondness corresponds to the classification of reality; it is the establishment of meaning, which depends on the biological properties of individuals. Thirdness is the socio-communicative interaction between individuals and can only be possible across social interaction; it is where the acknowledgement of the Other takes place. Brier (2013) argues that it is not possible to "generate knowledge without first accepting the reality of the other, your own body and consciousness, as well as the language you use" (p. 247).

Systemic-semiotics is based on Guddemi's interpretation of Peirce's phenomenology of experience, unlike cybersemiotics, in which principles stem from biosemiotics and Luhmann's triple autopoiesis (Brier 2009, 2013; Luhmann 1995). Nevertheless, the full consequences of these principles have yet to be determined, as does the role of cybersemiotics and systemic-semiotics in Systems Research.

Deeper research needs to be conducted into Maturana's structural coupling in order to understand the difference between cybersemiotics and systemic-semiotics approaches. As Maturana (2002) states, "The organization of a system is only one aspect of the relations occurring in its structure and does not exist independently from the structure in which it happens. A system maintains its class identity and remains the same under these circumstances, even if its structure changes, but only if, throughout the structural changes, the system's organization is preserved" (p.1). Structural coupling is critical to understanding the direction in which changes occur and the moment they affect the levels of other scales. For example, the disproportionate growth of cells in a next-one-up structural level, the tissue, can produce far-reaching changes which, in turn, affect the next fundamental tiers, as in metabolism or a living organism's development.

> I have named structural coupling to the dynamics of congruent structural changes that occur in a spontaneous way between systems in recurring actions (in fact, recursive), as well as the coherent structural dynamics that result from it. Living systems, as well the non-living environment in which they recursively interact, are systems structurally determined, with plastic structures that follow a course of change that emerges modulated by the flow of its interactions. As a result, living systems and their non-living environment change conjoined and congruently, forming a biosphere in the form of a multidimensional network of reciprocal structural coupling which emerges spontaneously as a result of the conservation of the autopoiesis of the living systems (Maturana 2002, p.1)

Cybersemiotics, as a type of second-order cybernetics, proposes an idea in which the production of signification in biological systems depends on structural coupling. Therefore, the study of meaning in humans must aim to complete the lack of knowledge about "the self-organization of cognition and the structural coupling of observers" (Brier 2008, p. 101; Vidales 2017, p. 25). According to Brier (2013), Peirce's semiotics combined with a cybernetic and systemic vision, such as that of Luhmann, is what constitutes the cybersemiotics framework. However, an ontology based on Luhmann's theory of socio-communicative beings can only conceive biological systems autopoiesis. These systems perform complex tasks with an efficiency as yet out of the reach of artificial systems. In this way, the cybersemiotics theoretical background cannot solve the incommensurability amongst machines, consciousness, and artificial intelligence.

Biological processes are complicated and have definite variables. Conversely, the way in which humans think and make decisions employing imagination has not been formalized. This is one of the current challenges for semiotics, although systemic-semiotics is focused on solving it. For example, fake news within any social network website is a disproportionally growing system: gossip is a vehicle for fake news. A super viral cascade[3] can be created and cause various changes in the original meaning or semiosis, and at this level, can affect the lives of people or

[3] When a difference of interpretation is large enough, between the individual and the collective, cascades of viral information arise, in which hundreds, thousands or millions of subjects share facts (true, suspicious, or false).

individuals. It produces variations of great depth[4] which in turn influence the next evolution of semiosis. An initial meaning can have many alterations stemming from the flow of fake news into the network. Long-range networks produce effects in the lives and decisions of people who decide to pay attention to fake news. In many cases, fake news can affect the functioning of a community and lead to crises.

Cybersemiotics addresses these phenomena within the range of biological beings. But the systemic-semiotics approach offers to measure the trajectory of meaning by its probabilistic evolution in biological and artificial systems. Measurements of meaning trajectories can be carried out based on the concrete limits of reality: the limits of life, time and interpretation (Valle 2015, 2017; Valle et al. 2015, 2016; Valle and Morales 2017). From the perspective of systemic-semiotics, founded on Peirce's phenomenology of experience, semiosis is a process in which an entity acquires meaning as icon, index, or symbol. The evolution of signs in network representations allows for the observation of the limits and types of semiosis. Through the network, it is possible to visualize how the other scales of life, physics, and society—as cells, tissues, organs, body, family, community, and society—transform the elementary constitution of meaning every time they cross the limits of life, time and interpretation.

Cybersemiotics and systemic-semiotics share the same theoretical background, but their scopes of understanding are not mutual. Subsequently, while sharing common interests, both have particular concerns. Cybersemiotics takes into account semiosis as a key element, but it is just one concept amongst many. Instead, systemic-semiotics is based on the tracking of semiosis through cultural scales as it engages science models through isomorphisms and, in this way, attempts to provide a theory of meaning to cybernetics. A sign is neither a physical entity nor a fixed semiotic entity. A sign is the meeting ground of the relations between elements of two systems, the transceiver and the receiver. Considering *sign-function*, Umberto Eco (1976) argued that:

> A sign-function arises when an expression is correlated to a content, both the correlated elements being the functives of such a correlation. […] Properly speaking there are no signs, but only sign-functions. Hjelmslev remarked that "it appears more appropriate to use the word sign as the name for the unit consisting of content-form and the expression-form and established by the solidarity that we have called the sign-function" (Hjelmslev 1943:58). A sign-function is realized when two *functives* (expression and content) enter into a mutual correlation; the same functive can also enter into further correlations, thus becoming a different functive and therefore giving rise to a new sign-function. Thus, signs are the provi-

[4] I understand dissipative structures as by-products of an interpretative semiosis which operates when there is a big difference in the interpretation between the public and the private meaning of a sign. These structures are called information cascade. Eric Sun, Itamar Rosenn, Cameron Marlow, and Sun et al. (2009), were the first to research this type of cascade phenomena with real Facebook data. According to these authors, the models of statistical evolution contributed to the comprehension of how diseases transmitted and, also, of how ideas between people transmitted through diffusion systems. These can be small structures at the level of a family, in a face-to-face discussion, or it can very well scale to the viral information; which, in its more outstanding cases have effects on the objects of a concrete situation and over the things of a virtual environment. (Friggeri et al. 2014).

> sional result of coding rules which establish *transitory* correlations of elements, each of these elements being entitled to enter—under given coded circumstances—into other correlation and thus form a new sign (p. 48–49).

Therefore, the definition of code in Eco's semiotics implies a process of structural coupling, between the elements of different systems. These systems are (A) a set of possible behavioral responses, (B) a set of states of things in the world, and (C) a set of signals correlated by arbitrary combining. To distinguish his code definition from Shannon's, Eco denominated it "S-code" or code as a system (Eco 1976). Another way of naming S-codes is "semiotic systems." One of the most studied semiotic systems, as a particular semiotic, are social institutions (Klinkeberg 1996). On the other hand, the simplest semiotic systems are the color codes on traffic lights, or underground signals combinations (Eco 1976). For Eco, a semiotic system is a structure, an S-code, capable of replacing the purpose of meaning that associates elements of different systems. Hence, they can be studied by a theory of information, structural generative theories, or by "a theory of codes" (Eco 1976).

From this perspective, if a semiotic system has, at the same time, exceptional longevity and actuality, as do language, kinship relations, or economic organizations, then the tracking of semiosis via networks models will be possible as an information structure. The tracking of semiosis through digital networks therefore, allows us to see that the vulnerability of the individuals grows as they contrast the signs meaning with concrete systems. Digital networks enable us to observe the interaction between the consciousness of individuals. Many of the networks correspond to the brain operations in which real, complicated, valuable, complex, or accidental thoughts are formed. Digital networks are also based on a specific process consisting in networks of networks of signs articulations. In this manner, the idea of semiotic systems is similar to the concept of autopoiesis' triple articulation by Luhmann (1998), although these systems are interconnected through semiosis. Consequently, the systemic-semiotic hypothesis posits semiosis as the unit of consciousness analysis and network representations as a theoretical and methodological tool to experimentally observe the evolution of meanings. Meanwhile, cybersemiotics contributes to the ontological framework of all evolutionist theories of meaning within Systems Research.

The systemic-semiotics approach provides a different interpretation of Luhmann's concepts than that of cybersemiotics. While cybersemiotics ontology is focused on triple autopoiesis of the socio-communication theory of being, systemic-semiotics attempts to support a dialogue and collaboration with other disciplines to understand the evolution of semiosis, as well as the social and artificial properties of consciousness. Some of the most important disciplines in dialogue with semiotic-systemics are axiology, praxiology, teleology, and category theory. Thus, to build a network model which represents the trajectories of semiosis with the greatest fidelity, it is necessary to know the conditions in which meanings are assigned and, therefore, the values of context in culture. Axiology studies the nature of emotions, and how they affect the assignation of values to objects. According to François (2004), the systemic scope has had an impact on axiology for the following reasons:

1. To the extent that it establishes a hierarchy of nested and interdependent systems, the systemic scope must lead to a new examination of the rights, responsibilities, or reciprocal needs of each system and co-system within corresponding supra-systems and infra-systems.
2. It introduces a strong temporal dimension, obligations, rights, and responsibilities which must be considered within a future perspective, corresponding to different time scales.
3. By proposing a specific way of understanding the observer's relationship with that which is observed, and, in particular, with the relationships between several observers, systemic axiology should focus on consensus and co-participatory decision-making.
4. Systemics introduces a new understanding of the nature of cultural differences, while systemic axiology should strive to find satisfying transcultural values (François 2004, p. 56).

Efficient allocations of values and semiosis depend on the series of necessary conditions which are studied by praxiology, according to Kotarbinski (1995). Praxiology is "the discipline of the efficiency conditions of all action, practice and praxis" (p. 32). It is a specific methodological approach, which empirically explores ways of doing activities and praxis. Its scope is the philosophical and theoretical foundations related to action, in general. Cyberemiotics is based on Luhmann's principles (1995), where sociocultural evolution is a basic process that produces elements of communication acting and interacting with other elements to generate social systems. The principles of praxiology are very useful to understand the cybersemiotic relations among actions and elements, and between the act of communicating and its relationship with information.

McWhinney (1997) observes that practice and praxis are different, as concepts, because practice focuses on the habitual and the systematic processes of a task. "[T]he mode [of doing something in practice] follows a set of implicit rules of theories and also follows a program." In contrast, praxis "is the study of practices to achieve goals" (McWhinney 1997, p. 80). It focuses on the intention, without the limitations of a definite set of rules. The study of "achieving goals, objectives, and the purposes of a system" is carried out by teleology (Young 1974, p. 299). According to Bohm and Peat (1987, p. 43), "it is a metaphor of mechanism." It is also "the study of directed behavior" (Bertalanffy 1956, p. 7). These principles imply that any deterministic mechanism would seem to pass on an inevitability of definite future states; in this sense, "teleology involves Newtonian and Laplacian type mechanisms without any necessary reference to the purpose" (François 2004, p. 616). It is important here to make a pause. At the beginning of this chapter, I questioned whether Systems Research was a paradigm shift or not. Later, I introduced the ISFR discussion of the topic. ISFR divides Systems Research into three categories: Systems Thinking, Systems Science, and Systems Engineering. Up to this part of the text, the cybersemiotics ontology and system-semiotics have been used to focus on Systems Science, as well as on axiology and teleology. However, these do not offer an exclusive perspective. We can also reflect on Systems Thinking, Systems Science and Systems Engineering as philosophies.

Contrary to Systems Science, the study of achieving objectives (teleology) from a Systems Thinking perspective posits the concept of "purpose" as non–deterministic in Newton and Laplace's terms. It could even be understood as an objective of the system or probabilistic evolution (Young 1974, p. 79). Hence, research on teleology requires knowing the purpose of a system "to avoid causality problems" (François 2004, p. 616). Then, the deliberate reactions that control the error in feedback are the purpose of the system. Such is the difference between the state of an object, at any time, and its final state; none are fully deterministic, but both are probabilistic (Rosenblueth et al. 1943). The final tool for the foundations of Systems Research related to semiotics is *category*. It is a defined set in a classification system of objects, processes or relationships. Joseph A. Goguen and Francisco J. Varela (Goguen and Varela 1979) wrote:

> The intuitive idea of a category is that it embodies some structure by exhibiting the class of all objects having that same structure, together with all the structure-preserving mappings or morphisms among them. (Somewhat more technically, categories assume there is an associative operation of composition on those morphisms whose source and target match.) This idea is due to Eilenberg and MacLane. […] Usually, we are interested not only in objects from various categories, but we are even more interested in certain constructions performed on the objects of one category to yield objects of another category (p. 39).

For systemic-semiotics, the importance of categories is to find isomorphisms between disciplines. This condition indicates that isomorphic relations are much more interesting than the structural relations of a system, which are the historical ties to a circumstantial space. While an isomorphism can be considered the "perfect" analogy, "no model is entirely isomorphic to the modeled object" (François 2004, p. 322). Isomorphism based on the structures and functions of different systems admits the creation of classes of models with similar properties, for which generalizations covering multiple concrete systems and time scales can suitably operate (Beer 1968). Also, isomorphisms "allow a certain degree of algorithmization of knowledge for numerous entities and complex situations", which may be more or less similar (François 2004, p. 322). This property leads to an algorithmic understanding of semiotic knowledge so long as semiotics is considered "the doctrine of the essential nature of semiosis and the fundamental varieties of possible semiosis" (Peirce 2012, p. 497–498).

Indeed, there is a distinction between isomorphism and homomorphism. According to Vallée (1990), the multidisciplinary or transdisciplinary character of systems theory has, as its fundamental purpose, to find the structural isomorphisms between systems that belong to different disciplines or between representations of the same order. Wiener refers to such isomorphisms as mere homomorphisms in his work *Cybernetics* (1954). The search for this type of isomorphism, or proper homomorphism, leads to the concept of a model that allows the representation of a category of systems. The model of an isomorphic representation may result, however misleadingly, because, as Korzybski states, "the map is not the territory" (Vallée 1990, p. 56). Beer (1968) establishes that "[H]aving improved the concept of models, and the contents of our opinions […], the scientist produces two deep levels of homomorphic models, and these can be isomorphic with each other" (p. 113). As for homomorphisms, they can be known through the isomorphic process of interaction, and then operate regulating the content of messages. In this sense, "the interaction between systems or parts of systems with a pre-arranged code" is the second best-known definition of communication from the systems paradigm (Young 1978, p. 290). The isomorphism between cybersemiotics and semiotic-systems is related to the limits of biological systems and the traceability of semiosis into social systems. Thereby, the suggestion is that isomorphisms in communications and semiotic theories are best understood as entropy and information because these structures are present in all domains of semiosis.

Summarizing, at the beginning of this section I tried to answer the question: Is Systems Research a paradigm? All the briefly revised frameworks are part of the influence of systemics in some foundations of the theory of knowledge. However, they do not carry a paradigm shift, nor do they imply an innovation in the form of doing science. On the contrary, Systems Research requires classical or small science. The reductionist knowledge of small science takes place in the three categories of Systems Research: Systems Thinking, Systems Science, and Systems Engineering, although the dialogue between them requires a transdisciplinary foundation. Systems Engineering is a consequence of the evolution of scientific knowledge. The best way to label this framework is to see it as the modern way of scientific dialogue across small sciences within big science. It is the return of first-order philosophy, and one of the many paths to access it is through the systemic-semiotics approach.

Systems Thinking involves a deep reflection on what knowledge is in a complex and complicated world that evolves dynamically. The central notion is how does meaning emerge across intersubjectivity, avoiding mechanistic schemes of explanation. A second-order philosophy is required and cybersemiotics ontology is the most suitable aid. Systems Science requires a lot of isomorphism to pair one meta–theory with another in a transdisciplinary field. Maybe in the near future, there will be a third-order philosophy emerging from the dialogue between transdisciplinary knowledge. At the moment, the argument is taking us to the convergence between the cybersemiotics and systemic-semiotics approaches. The proposal is that isomorphisms between them are best understood as entropy and information. Both processes have in common that they act over open systems. Next, we will review what are open systems, how do they treat information, and how is this relevant to cybersemiotics and systemic-semiotics research.

9.3 Open Systems

Cybersemiotics ontology has its basis in the Peircean work, whose "semiotic philosophy seems to be the only place to turn if one wishes to include human consciousness in the theoretical foundation of an evolutionary theory that also contains a material world, living systems as well as language, and the social-cultural world of intersubjective linguistic communication" (Brier 2009, p. 32). Cybersemiotics establishes that it is possible to integrate emotions and causality in an ontological view, which suggests that autopoiesis' triple articulation permits the differentiation of an event of self-consciousness from a biological behavior (Brier 2013). This ontology sets a philosophical foundation for cognitive semiotics to explain how self-consciousness evolves towards a point of creation of signs and language games. In this sense, cybersemiotics places information as a basic conceptual component of its ontology (Brier 2008, 2013). In other words, the transdisciplinary perspective of cybersemiotics leaves aside the processes of information as flow, spread or order. It takes up questions about the information processing from semantic and pragmatic perspectives, different to those which are generative and reductionist. Thus, it is propped up as a transdisciplinary science of information (Brier 2008). Still, the great problem of cybersemiotics is how it deals with real-world open systems. How do we study and define open systems without resorting to reductionism? How do we restrict a cybersemiotic and transdisciplinary interpretation? Both second-order philosophy and first-order philosophy have the same transdisciplinary object in common: open systems. This section explores open systems as a systemic concept and how this concept is treated in a first-order philosophy like systemic-semiotics, and in a second-order philosophy, like cybersemiotics.

A system is a point of view, a universe of discourse predefined by a frame of reference (Weinberg 1975; Pask 1968). The idea of a system comprises a set of general concepts conceived by man as involved in, more or less, identifiable and permanent patterns of coherence in the real world (François 2004). Ilya Prigogine (1993) postulated that dissipative systems are non-equilibrium dynamic systems, open and with internal gradients. They maintain a low stable entropy condition by transporting matter and energy beyond their limits, consuming energy, and presenting cycles of matter and energy, which can also be understood as the development of complexity by exporting and dispelling entropy to the environment (Prigogine 1978; Prigogine and Nicolis 1967, 1971).

The core topic in systemic-semiotics reflection about culture is whether the difference between personal and collective interpretations generates dissipative structures of entropy to maintain the dynamic equilibrium of society. Hence, if a virtual meaning is not consistent with a concrete environment, it does not comply with the dynamic stability, and it therefore becomes unstable. Subsequently, the system will exhibit strong fluctuations that will lead to a very slow relaxation towards a state of equilibrium, that is, towards its extinction. Those points of instability generate a crisis (Haken 2013). In the third section of this chapter, I demonstrate how the so-called information cascades are dissipative structures. Sun et al. (2009) were the first to study this type of phenomena with real Facebook data. According to the authors, models of statistical evolution as well as their dissemination models have the ability to explain the contagion phenomena; ranging from social movements to the spread of diseases. However, others have wondered about information and its relationship with dynamic systems and dissipative structures, Erwin Schrödinger (1992) stated, in a dissertation on the Second Law of Thermodynamics, that changes and relations between physical energy and matter have a strong correlation with the evolution of thought and consciousness. The paradox he described establishes that entropy (thermal disturbance) increases invariably in any isolated system, however, this does not occur in open systems, like living and social systems; as organization scale increases, a much more complex shape can be found in the order of the parts (Schrödinger 1992).

Modern biochemistry acknowledges that electron influx provides energy to all organisms, which explains how almost all living beings receive energy directly or indirectly from the sunlight radiation. Nonetheless, the capacity of cells to receive and act on the signals that come out of them requires a process of chemical change, known as *signal transduction* or *biosignaling* (Nelson and Cox 2015). Biosignaling is a process that makes visible how living systems generate order from order; in contrast to complexity sciences, where disorder creates order (Mitchell 2009). Modern biochemistry explains that organisms evolved to import high-quality energy from ordered systems. This allows them to prolong their existence in a universe governed by the second law of thermodynamics. Thus, according to Schrödinger (1992) and Schneider and Sagan (2008), both the operation and the self-organization of a living system are related to its context, and the hierarchy in which energy and matter have organized and transformed.

Biosemiotics provides an explanation of communication processes beyond human reference. Thomas A. Sebeok (1991) studied communication transversely into different biological species. Biosemiotics is divided into zoosemiotics for the study of biosignaling, while anthroposemiotics studies the processes that generate semiosis. Cybersemiotics is the direct heir of biosemiotics, not a disciplinary branch, as Brier (2008) explains, its philosophy is part of the foundation of Information Science. Thus, as a central challenge for cybersemiotics, lies the study of communication between species, and the properties that make the human species unique. For cybersemiotics, a holistic view of structural coupling between life, society, physics and intersubjective semiosis, is at the core of conceptualizing cognition, communication, life and an ethological paradigm. Like biosemiotics, cybersemiotics is a science of living systems' signs, with a transdisciplinary aggregate, and whose purpose is to unify knowledge into natural and social sciences. Conversely, a first-order philosophy as a systemic-semiotics serves as a meta-methodology, whose purpose is to describe the trajectory of signs across the changes of variety in the states of the reality. Systemic-semiotics has a unique starting point: semiosis, with which, consequently, follows the material transformations of signs by the effect of human volition.

Human beings are dynamic and complex system depending on tissue density and conductivity, metabolic heat produce by organs, and their spatial distribution (Werner and Buse 1988). Even for a system that focuses on importing high-quality energy as a living system does, mechanisms to dissipate entropy and maintain thermal equilibrium are required. It is remarkable that the temperature of the human body, regardless of the environmental climate, ranges approximately at 37 degrees Celsius, which means that the thermal stability of a "human" unit requires a system to dissipate heat and steady its temperature. Prigogine's dissipative systems imply that the creation of meanings through biological consciousness, like that of humans, requires a constant process of energy transfer across its limits. Meanwhile, the internal energy of the system must maintain a continuous temperature due to the thermal difference between the system and its surroundings. In other words, the molecules and ions of a living organism differ depending on the type and concentration of those found in their environment. As a result, living beings have a composition distinct from that of their environment. This “keeps them in a dynamic stationary state because they are never in balance with their ambiance” (Nelson and Cox 2015:21). Within this “steady and dynamic state”, the population of molecules of any organism is far from static; it continuously synthesizes and degrades molecules through chemical reactions that require a constant flow of mass and energy. When a cell is unable to get energy, it dies and initiates its degradation towards equilibrium with its environment (Nelson and Cox 2015, p. 21–22).

Here, a question regarding life and conscience arises: what and how are we? After age 30, we are far from being the pair of haploid cells that gave life to us. And yet, we are identities with individual histories in a dynamic and stable state. Perhaps an answer lies in the physical foundations of our nature. Physics textbooks explain that the value of temperature and internal energy of a system are variables of a state due to their dependence on current thermodynamic phases, and not to the process that led them to that state (Serway and Jewett 2014). The process that led us to be individuals of 30 years of age consists of the microstates of the human system; however, current thermodynamic phases are our macrostate. Ostensibly, a macrostate is only possible after a series of microstate transformations, occurring during our 30 years of life. As a zygote develops, the number of microstates and opportunities to continuously improve and constitute a macrostate increase over 30 years or more. An increment in opportunities entails a growth in statistical uncertainty, which is known in thermodynamics as “entropy or lack of information” (Serway and Jewett 2014:669). Whether a biological system has many or very few microstates is not relevant, “the most pertinent is whether those microstates are ordered” (Nelson and Cox 2015:23). If a system has microstates in random distributions, they would be very rich in entropy and would not contain much information. Instead, a system which has distributed microstates, of specific and limited orders and behaviors, is a system with low entropy and a lot of information: that is a dynamic and steady state.

Human nature, its physics and biochemistry, leads to other questions: (1) are there ways in which our biological configuration defines our semiotic and cultural arrangements? (2) Do organic designs determine human behavior? (3) Do biological structures determine the possible range of choices in life? (4) Where do genetic conditions end, and cultural conditions begin? These ideas and questions are not strange for cybersemiotics. The place where semiosis and life match could be modeled by Complex Adaptive Systems (CAS), a term which is a synonym for open systems on a thermodynamic gradient:

> The term CAS means an open system in a thermodynamic gradient (i.e. one far from the equilibrium). This is in part what Prigogine (1980) called “dissipative structures” but with many non-linear connections, and feedback mechanisms added. These systems are pre-

> stages to memory functions; they often have complex dynamic networks, which are locally differentiating and have emergent and holistic properties. Still, I would argue that these concepts need to be placed on a Peircean foundation, since I am unable to see how a physicalistic evolutionary foundation combined with the idea of emergence can function to make consciousness appear from totally inert matter in autocatalytic closed circuits (Kauffman in Brier 2009, p. 43).

Brier (2009) points out that there is a theoretical and philosophical problem when combining the theory of evolution with the emergence of consciousness. The former has a reductionist source, while the principles of the latter belong to second-order cybernetics. Another way to solve this is by applying Systems Research concepts like macroscopic and microscopic; however, these prefixes, macro-, mega- and micro-, could be confusing. Silvano Arieti (1969) suggested a level at which human cognition operates. It is an intermediate point between the magnitudes scale of the macrocosm of physics and the microcosm of atoms. This intermediate scale is related to living and human beings; he defined it as *mesocosm*: "life exists in the mesocosm [t]o originate and evolve, it had to incorporate mesocosmic laws" (Arieti 1969, p. 206).

Some years later, Joël de Rosnay (1975) applied the macroscopic concept as a conceptual instrument to observe what Arieti called mesocosm, that is, the scale of observation and experience where social phenomena occur. Life develops and ecological systems and socio-economic environments co-evolve. Within the approach of systemics and first-order cybernetics, attempts were made to unify the terminology proposed at the time by Arieti (1969) and De Rosnay (1975). The goal was not to create numerous terms competing with each other. Currently, the Systems Research is set to stop using the term 'mesocosm' and instead use *microcosm*, *macrocosm* and *megacosm*. (François 2004) Therefore, the prefix micro- is used for those levels that can be observed with the help of microscopes, Geiger counters, radio frequencies, etc. The term macro- is used for our natural level of observation, what we are able to perceive with only our senses; and the prefix mega- is for those levels that can only be observed indirectly, through telescopes and astrophysical instruments; these latter being studied based on observations and general theories (François 2004).

Edgar Morin (1972) also developed an idea of macrocosm as a double principle, resulting from the interrelation between a system and its ecosystem. Moreover, social systems, at least complex social systems, generate events. These processes of self-generation would be halfway between biological developments (which include the neuronal interactions typical of individual semiosis and interpretive signs) and accidental developments (which occur as a result of random encounters between systems and events). While individual systems respond to disturbances with their own determinism, or internal laws, the ecosystem responds randomly, or in a decentralized way (Morin 1972). In this sense, within the epistemology of systems the difference between event and element is basic: "the notion of element is a spatial ontology. The notion of event is a temporal ontology"; however, any element can be considered an event insofar as it is "considered to be situated within a temporal irreversibility as a manifestation or actualization, that is, according to its appearance and its disappearance, as a function of its singularity[5]" (Morin 1972, p.13); time allots a *coefficient of event* to all things. Consequently, at macroscopic level, there are at least three scales at which culture operates: limit of time, limit of interpretation, and limit of life. All of them interact with virtual and concrete environments (De Rosnay 1975). Hence, the processes of signification are subject to the laws of thermodynamics, to the physical laws of the universe, and to the complex structures by which we exchange and create meanings.

Brier (2008), Wilber (2001) and Ervin László (1987) have called this model *eco-systemic*; but each one of these authors has proposed a different framework to represent the model. The cybersemiotic proposal contemplates the relationship of human linguistic motivation as opposed to the ethological motivation of other living creatures, both correlated by means of embodiment[6] (Brier 2009). Systemics considers that biosignaling possesses configurations of macroscopic control, which redundantly operate in the system microstates' configurations of order. This correlation between organizational scales is essential for the understanding of the system as a whole. Macroscopic control configurations cannot be established at the same scale as cells, molecules, tissues or organs, as the components of a human body cannot exist independently; the whole anatomy is a product of the continuous interaction of its elements. The permanent arrangement of the parts allows the configuration of a whole, and such is the Circular Causation Principle described by Hermann Haken (2012, 2013): (a) in a self-organized system, its components determine the parameters of order behavior that successively define the response of the individual components; and (b) individual components are numerous, while parameters of order are rather few.

However, parameters of order compete with each other to govern the behavior of the entire system. The winning parameters of order will determine the actions of individual parts. Once one parameter dominates over others, they will all operate as a set, so that they can cooperate or naturally coexist. This is called *slaving principle*, when one of the settings enslaves some or the whole of the parts. Under such conditions, cooperation, coexistence, competition, and submission are the basis of self-organization (Haken 2012, 2013). Thus, if a single order parameter does not comply

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[5] "La notion d'élément relève d'une ontologie spatiale. La notion d'événement relève d'une ontologie temporelle. Or, tout élément peut être considéré comme événement dans la mesure où on le considère situé dans l'irréversibilité temporelle, comme une manifestation ou actualisation, c'est-à-dire en fonction de son apparition et de sa disparition, comme en fonction de sa singularité. Le temps marque d'un coefficient d'événementialité toute chose."(Morin 1972, p. 13).

[6] "Human beings and animals are always anticipating meaningful contexts connected to their forms-of-life. It is the inability to extract the person from his embodiment that anchors meaning in our psycho-biological being as something to be classified and developed by language and culture (Brier 2003). This is also clear in the development of the idea of the role of the body from Husserl to Merleau-Ponty's "naturalized" phenomenology. Therefore biology matters. But a mechanistic molecular biology does not have the philosophical, especially the ontological, foundation capable of explaining the inner experience of biological systems, their cognition through signification, and from there on to engage in communication, leading through evolution to the foundation of human language. For this, biosemiotics seems necessary" (Brier 2009, p. 38–39).

with the dynamic stability —if it is unstable— the system will fluctuate inducing relaxation and subsequently instability, and furthermore crises or death (Haken 2013). In a living being, the configuration of control is the principle of circular causality. The maintenance of that dynamic stability is due to the order parameters, this is, what keeps its parts ordered. All this structural dynamics is what Maturana and Varela call structural coupling (Maturana 2002). As we scale-up in the application of the mechanical laws in a living being, greater will be the degree of complementarity of matter through structural coupling.

For example, culture, which is a highly organized organism, is made up of millions of microstates: each human being. Well-defined parameters of order determine the relations between each one of these microstates. The most critical parameter of order in the human being scale is the prohibition of incest, which in turn defines the type of family and symbolic reproduction within human communities. The higher the dominance that a parameter exerts over the rest, the higher the restrictions on the limits of interpretation of the world will be. The longer a setting exists, the longer the ideas of the world given by this parameter will continue throughout the centuries. This state will make it much more susceptible to enslaving other parameters of order while interacting with the medium from which it imports energy for its existence (Valle et al. 2016; Mora et al. 2017; Valle and Morales 2017; Valle 2017).

Yet, culture incorporates new parameter of order through its social institutions. Such are the modern states of equity between people, as gender and transgender relations between humans. Consequently, there are new forms in kinship structures and biological reproduction functions. These contemporary lifestyles have generated states crisis within older cultural structures. They are no longer compatible with the concrete systems from which they obtain energy for their existence. Systems opened to information—a type of open system— refer to systems whose dynamic and steady state are designed to react to information, not to entropy. They need a way to dissipate all the entropy produced in each small scale and this necessarily leads the entire system to complexification. Parameters of order increasingly become more structured so as to obtain major gains toward information equilibrium. Such is our hypothesis to assert that culture is a superorganism above human beings.

As of today it is necessary to test if this hypothesis is falsifiable and contributes to scientific knowledge (Popper 1957). Until the time of its verification comes, this idea will remain metaphysical and unfalsifiable. Nevertheless, at the turn of the past century, the concepts of atom and gene were abstract and unfalsifiable. Science has always dealt with the challenge of building concepts out of philosophic ideas, including metaphysical, unfalsifiable. The traditional way of doing so is through the scientific method. In such fashion, we have hypotheses and specific protocols to test any phenomena. Still, in other situations, there is no protocol to follow, nor mathematical formulas to help us, nor deductive systems to be applied. That is almost always the case for real open systems phenomena. In these situations, we only observe the results of something happening. The method cannot be deductive, and so, it is inductive. Inductively, scientists have the task of choosing one or another axiom, theorem, theory, or rule, which could be the possible answer for the perceived result. Furthermore, as Schrödinger noticed, the understanding of the complexity of life and culture via deductive systems is like trying to understand a work of art like the Sistine Chapel, Mexican muralism, or Renaissance architecture knowing only what the dots and lines are.

The choice between a research method, whether deductive or inductive, is related to an epistemological dilemma: the former corresponds to the vision of a universe of unilinear evolution, while the latter corresponds to an interconnected and adaptive world. For example, within theories of language, some assume that natural language has an internal evolution independent of environment. This is known as the deep structure of linguistic expressions. The changes occurring in grammar are justified as derivations of the development of grammar itself, as if it was a mechanism independent of humans. The most widespread theory of language under this perspective is the transformational generative grammar (TGG) by Noam Chomsky (1956). Other theories of language, like the Sapir-Whorf hypothesis, postulate that languages only exist as an effect of the community of speakers and that the environment has an essential role in their existence, conservation, and evolution. They presuppose that permanent contact with the context affects the development of language, as well as its adaptation. Consequently, environmental circumstances and needs, including social life, define the life cycle of a language (Carroll 1956). Different scientific disciplines posit similar ideas: the idea of unilinear evolution opposes the conception of interactive adaptation.

The systemic approach states that both research methods are adequate, the deductive method is appropriate to explain and know the life cycle and *life limits* of phenomena, while the inductive method is essential to conceive how the selection of processes of self-organization works for increments or reductions of complexity in a system, i.e. the *time limits*. In both cases, the concept of the variety of states in reality is fundamental to understand the limits of life and the limits of time. The real challenge of a philosophy of information and communication lies in finding the relationship between our biological reality and consciousness. Cybersemiotics and systemic-semiotics are based on similar questions and principles; both agree that only the framework of evolution could explain language and consciousness. However, the ordering of concepts and notions is not the same: cybersemiotics proposes an ecosystem model, in which the integration of biosemiotics and cognitive semiotics occurs through embodiment. Thus, cybersemiotics includes human consciousness in the theoretical foundations of the theory of evolution, using Peirce's semiotics and Luhmann's arguments on autopoiesis.

This new transdisciplinary work requires ontological foundations to sustain scientific discourses and verification on reality. In this sense, cybersemiotics as a second-order philosophy is best suited for problems that encompass Systems Thinking. Whereas system-semiotics, as a first-order philosophy, serves as the foundation of Systems Engineering. Under these considerations, coincidences and differences between both philosophies of science were briefly addressed. Open systems are a common ground, the nature of which is dynamic and depends on the laws of thermodynamics. Within these laws, the most interesting for semiotics are those related to the transformation of matter into energy and, in turn, into information, a process of transduction. Transduction is an effect of the interaction between systems that have significant differences in the variety of states between them: Prigogine's dissipative structures.

The next topic is Ashby's Law of Requisite Variety (1958), a key concept for understanding structural coupling and its role in the emergence of consciousness from a first-order philosophy. The motivations behind the exchange of the variety of states between systems have different explanations in cybersemiotics or systemic semiotics, as both approaches observe different aspects of reality. Hence, beyond opposing each other, they also complement one another. "The law of requisite variety says that R's capacity as a regulator cannot exceed its capacity as a channel for variety" (Ashby 1958, p. 86); variety embodies variety. This means that a system can only integrate the amount of variety of states the system has by itself. Consequently, if the number of external states is greater than the number of possible responses in the system, an internal redundancy within the system will occur. In a cybersemiotics ontology, this implies that we can only know what we already know. But if we want to understand and have more signs to deal with the world, more variety to our variety of inner states must be integrated.

According to our first-order philosophy, the recognizable variety at the microscopic level will always be less than the variety of states at the macroscopic level. One of the fundamental properties of human consciousness is the ability to increase the variety of the microcosm through learning. An open system, such as culture, moves far from equilibrium due to continuous and discontinuous disturbances in its variety of states of energy, matter and information. The mathematical concepts such as control configuration, control parameters, and parameters of order can be used to model external flows (Haken 2012). The exchange of variety in an open system shows compensatory changes between the parts of the system. Ashby (1958) proposed a model to correlate the response of a system to an exchange of variety. In this model, he represents the inputs as a set of disturbances with the variable d_i, which can be met by a set of responses, represented with the variable R_j. The outcomes of the system are the schematic idea of the possible new internal combination when external variety is larger than the internal; the variable to represent the set of possible outcomes is z_{ij}, as shown in Table 9.2.

Table 9.2 Binary matrix of disturbances and responses

		Response			
		R_1	R_2	R_3	…
Disturbances	d_1	z_{11}	z_{21}	z_{31}	…
	d_2	z_{12}	z_{22}	z_{32}	…
	d_3	z_{13}	z_{23}	z_{33}	…
	d_4	z_{14}	z_{24}	z_{34}	…
	…	…	…	…	…

The binary matrix constructed from the non-linear interactions between the disturbances (d) and responses (R) of the system. Source: Ashby (1958)

This is the case for living systems. Because of their thermodynamic conditions, living systems contain *being born* and *dying* as states of variety. But, what about the survival instinct? It is also a part of humans; the survival instinct is an absolute aim, which sole purpose is *to not die*. Due to our thermodynamic condition, it is impossible for almost any living system to absorb an *eternity* state of variety (except for the *Turritopsis Nutricula*). Therefore, a living system adapts to the array of events: *prolong life*, *postpone death*, *do not die* and *reproduce*. The survival instinct produces highly specialized strategies, medications, prostheses, lifestyles, and adaptation to extend a living being's existence. However, the Law of Requisite Variety suggests that every system must consume states of variety from other sources to reach equilibrium or achieve its objectives.

Let's imagine how the Law of Requisite Variety operates in a broader scale, such as the system of life. Life as a system would have a set of well-defined states and elements, what biologists call the *domains of life*: *eukarya*, *bacteria* and *archaea*. *Eukarya* contains the kingdoms of *plantae*, *fungi*, *animalia* and *protista*. The exact variety of Earth encompasses such domains, their kingdoms, and species. If certain species can prolong their existence, it is at the expense of other species losing that state of variety. The Law of Requisite Variety implies that extending the life of some species occurs at the price of absorbing states from other species, just as pharmaceutical penicillin needs live medium to grow (Kardos and Demain 2011). The solid-state fermentation media for penicillin culture contains corn steep liquor, lactose, and inert solid supports (Taşkın et al. 2009). It takes a considerable amount of resources and energy to transform matter in such media: land to cultivate corn to feed and raise livestock, so that it produces milk to extract the lactose; furthermore, the industrial transformation processes of all these products imply a long path toward producing high quality results. The extraction of these primary resources requires the modification of a space that contain a vast collection of biological entities; that is to say, other living systems necessarily perish so that another living system may adapt itself to a *prolong life* state. Thus, there cannot be more living states than the system itself as a whole; the only way is to absorb other forms of life variety with the same quality so as to prolong one form of life in particular.

For example, the bacterium *Helicobacter pylori* lives in the stomach of primates. It has a spiral shape that serves to attach its body to the tissue that covers the inner lining of the stomach. It takes up to 7 days to incubate, and from 38 to 48 h to reach maturity. Its reproduction takes place after 55 hours, and its decline starts around the 66th hour. The last phase of its life is described by a change in its spiral shape, transitioning to a spherical shape. There are 35 known species of *H. Pylori*; some of them are related to pathologies of carcinogenesis in humans. Colonies of these bacteria thrive in a high acidity environment, as these bacteria present extreme adaptation to gastric mucosa; hence, it has undergone an acclimation to acid. Another characteristic of the *H. Pylori* is its resistance to antibiotics. When these bacteria feel threatened, the spiral shape transits to a spherical or coccoid state that allows the next generation to remain in incubation for 3–4 days, protecting them from antibiotics and accelerating their reproduction. Colonies of *H. Pylori* cultivated in labs have a diameter of 0.5 to 0.2 mm. When measured, the growth density permits us to determine the risk of ecological imbalance; i.e. human bacterial stomach infection (Boyanova et al. 2011). *Helicobacter pylori* will do anything possible to survive, remaining unconcerned about its ecological environment: its human host, culture, the deforestation required to produce antibiotics, nor human societies and technologies. It might even be thought of as a kind of predatory collective consciousness. Presented with the opportunity, colonies of *H. pylori* will not only propagate throughout the environment that surrounds them but will also do anything possible to expand themselves beyond their limited ecological space and colonize other environments. Despite the shortness of its life, its propagation capacity is rather impressive, the varying species of these bacterium and mutations have spread over the last 58,000 years to 50% of the world's human population (Linz et al. 2007; Atherton and Blaser 2009).

Still, one of life's main characteristics is that a change in one component produces a compensatory change in another. This property allows for the characterization of each set beyond its parts (Nelson and Cox 2015). Each compensatory change defines, in one way or another, what we consider a living being. Such is the case of the components of an organism at the scale of a cell colony, a tissue, an organ, a living being, a family, a community, a habitat, an ecosystem, or a planet. The variety of states definition expressed by the system is the systemic tool with which to study compensatory changes like these. Hence, the importance of the Law of Requisite Variety: it is a means to understand the unity and diversity of any entity whatsoever. Variety is a set of states of things in the world interconnected amongst themselves; in other words, it is the consequence of complex interconnection between states of reality.

In addition, we must not forget that another of life's qualities is its high degree of chemical complexity and microscopic structure which result from the intricate internal arrangements of a cell which, in turn, is made up of thousands of different molecules (Nelson and Cox 2015). This property is *heterogeneity*, which provides cells with a unique ability to interact selectively with other molecules. *Variety* is a property that habilitates the differentiation between elements within a set of parts. Whereas spatial variety is the differentiation between the spatial limits of a system, temporal variety refers to the compensatory changes through a succession of time. (Vallée and Ashby 1951; Grossmann and Watt 1992; François 2004). The enormous structural variety of each life system accounts for an array of structures connected within a system.

Why are we interested in knowing the variety of states of a system? The heterogeneity of what? The central interest of understanding the nature of diversity, in addition to the general aspects of the Law of Requisite Variety, is to clarify Ashby's principle suggesting that "Only variety can absorb variety" (Beer 1993:22), in order to distinguish the quality of variety and its degree of order. A sample of disordered letters might be as follows: {i r n a r d y a e t y t e s o i c v r a y e t v}. After ordering them by types, we can determine that it reads {v a r i e t y c a n d e s t r o y v a r i e t y}. The first sample with the 24 letters contains no information, but is rich in entropy; while, in the second sample, they carry no entropy, but are rich in information—especially for an English speaker. Both samples have the same structural variety, 24 letters, but there is something in their organic variety that differs. In the first one we get 24 entities without relation between them, while in the second sample, we find 24 entities related amongst each other. Three properties derive from the last: the combination of letters in words “variety”, “can”, “destroy” the relation between them, and the meaning in the English language. This type of variety is associated with the meaning of the parts and is found within the domains of semiosis. But a further level is required to understand “variety can destroy variety” as an essential part of the Law of Requisite Variety, it is meta-semiosis or the domain of cybersemiotics ontology. According to cybersemiotics ontology and Luhmann’s principles, the first level of consciousness is the capability to distinguish between the identity and the difference of an open system (Luhmann 1995). This process occurs due to the Ashby’s law.

The adaptation of a conscious system to a precise context or goal presumes the result of an evolutionary process in which absorption of a variety of meanings occurs (Baumeister 1986). Such is the case of individuals who adapt to the identity within their culture. All individuals’ origin is birth, and their development goes on continuously for as long as they learn to identify the variety of states and limitations of their context. Context does not only mean the environment, but individual bodies as well. Throughout life, the limits of reality restrict the degrees of conscious maturity. In the process, individuals assimilate or reject symbols of diverse cultural content in a natural way (Ramachandran 2012). Symbols, icons or indexes that circulate through human interaction within a particular culture do so through time and space; not in an isolated or random manner, but from cultural interpretation rules that we understand as codes. While coding and decoding regulations is called *systems as a code* (S-code) or *semiotic systems* (Eco 1975, 2000), from a systemic approach, the process of semiosis expresses the exchanges and leveling of the variety of information.

This principle provides a general epistemological foundation for biosemiosis, zoosemiosis, and semiosis. In concrete closed systems, the increase of disordered variety is the measurement of uncertainty, which is necessary to know the behavior of any system. Dealing with “the level of uncertainty of a system depends on these elements of disorder” (Pask 1960, p. 116). In open systems, there are high techno-scientific research areas such as biosignaling to determine the uncertainty of biological systems. This discipline explains that cells need to communicate with each other to transduce energy in matter and replicate biological information. The increase of variety of states implies an increase of order in molecular interaction and more complexity in life structures (Nelson and Cox 2015). Meanwhile, in systems that are open to information, transducing matter into energy and reproducing social information requires messages, which are a form of super-organized order patterns. There are several areas of research to explain how information combines within social entities including linguistics, anthropology, history, sociology, psychiatry, neuropsychiatry and semiotics proper.

How do we absorb this variety of states? Information and order play special roles in this process. Human life is a living system which extends into information. Most social animals, like insects, bacteria, fungi, and mammals, modify their own body to adapt to the environment, and sometimes they modify the context and adapt it to their needs. But all of them come from a simple set of elements and rules, decentralized and dependent of the whole system. Indeed, human systems have centralized processes across social institutions. Centralized processes imply a huge intersubjective semiosis called "free will." The difference with other living systems is the manifestation of personality and capacity for personal decision-making. Intersubjective expression and semiosis could be unlimited if understood as part of imagination. An intersubjective idea can lead to a centralized process, like religion, language, economy, or social organization. Conducted by this idea, the systemic-semiotic approach proposes that the process of semiosis expresses the exchange of the variety of information across many scales: intersubjective, private, collective, public, centralized and decentralized.

One of the most significant contributions from the sciences of language is the idea that language is an entity that only has life within a collection of social interactions. For example, the word "stadium" and the word "ballpoint pen" have meaning according to an agreement between the members of a linguistic community. They have learned and replicated tacitly to name the individual experiences that make up the social existence of a stadium and a ballpoint pen. It would appear as if semiosis, at the scale of a particular culture, is something more than a simple process of interaction and exchange of information. From the systemic perspective, a thing is not a single thing, but many things; this depends on the scale of observation, operation and temporality. However, understanding the variation of information states of semiosis is always done from the perspective of culture. Within society, we can observe the organization and disorganization of ideas. Positive entropy dissipates within social relations, while an intricate network of individual, collective, public and private relations motivates negative entropy or disorder in information structures. Thus, researching about the Law of Requisite Variety in semiosis has the aim of formalizing the interaction inside conscious systems, composed by a network of networks of semiotic systems, necessarily interconnected across biological, physical, and social scales which generate order (Luhmann 1998).

Summarizing, the system-semiotics approach has a methodological and applied purpose; while the purpose of the cybersemiotics ontology is to constitute transdisciplinary and general semiotics. In cybersemiotics, the theory of information, communication, meaning, language and the production of signs are gathered within an evolutive framework. In both frameworks, coevolution and adaptation of conscious subjects employ semiosis. Semiosis corresponds to the operations of consciousness which organize the variety of states of reality in the form of pure, complicated, precious, sophisticated, or accidental thoughts. In the last century, Umberto Eco opened a discussion to determine if semiotics is a discipline or a field of research. In response to this problem, he divided the program of semiotics into two parts: general semiotics and particular semiotics. General semiotics encompasses information theories, communication theories, the theory of meaning and of signs in general. Particular semiotics is related to special applications for modeling a semiosis process, such that it occurs in a methodological and applicative order.

In a systemic perspective, cybersemiotics is a transdisciplinary and general semiotics. Systems-semiotics, on the other hand, is a meta-methodological approach and a particular semiotics of Systems Research. Cybersemiotics and systemic-semiotics are complementary. However, their analyses and syntheses of reality are different: cybersemiotics is a purely philosophical framework and systemic-semiotics is a more practical-theoretical framework; notwithstanding, both share common theoretical reference frames and similar semiotic principles. Cybersemiotics agrees with Luhmann (1995) on the networks that connect semiotic systems and meaning. The systemic-semiotics approach goes further to propose that semiosis organizes ideas in the form of semantic networks which help to dissipate entropy through an intricate arrangement of individual and collective relationships. In both cases, their research objects are open systems and share systemic problems, like dissipative structures of semiosis in open systems, but while cybersemiotics applies Luhmann's triple autopoiesis to solve them, systemic-semiotics proposes the Law of Requisite Variety to understand the evolution of semiosis. In the next section, I will describe in detail a systemic-semiotic proposal to formalize cultural phenomena and the nature of the differences when compared to cybersemiotics.

9.4 The Organization of Thought Through Network Theory

A conscious system is a network of semiotic system networks, of necessity interconnected through semiosis. Therefore, the systemic-semiotics hypothesis posits that the conscious unity is based on semiosis, and it is possible to formalize it through complex networks and their theoretic representations. In this way, the evolution and adaptation of cognitive subjects is carried out by semiosis, because: (A) semiosis covers the operations of consciousness which organize pure, complicated, refined, sophisticated, accidental etc. thoughts; (B) these systems are understood as networks of semiotic system networks, necessarily interconnected through semiosis; and (C) therefore, the systemic-semiotics posits semiosis as the unit of analysis for consciousness.

Cybersemiotics ontology has another hypothesis: "[t]he becoming aware brings into being the descriptions that lead us to postulate self, environment, etc. When becoming becomes aware and begins to make the distinction between one self, the others, and the environment, an ontology will necessarily be produced as a prerequisite for the production of meaning in language communication. The concept ontology does not refer to a final and unchangeable, true picture of the world or reality" (Brier 2013, p. 247). Cybersemiotics principle is that to become aware of oneself it is necessary to go through evolutionary stages. First, it is necessary to recognize the variety of different states that surround us. The second is to recognize the array of collective representations to interact with reality, built on from a variety of known states. To this extent, the state of the evolution of an anthill, a pack of wolves, an octopus, and a human being could be considered as within this stage. The third evolutionary stage consists of expressive and personal representations of reality. Cybersemiotics calls them ontologies. This philosophical position is the basis of any evolutionary semiotics; as is the case of systemic-semiotics. The "first overview of the cybersemiotic idea and to explain how the integration of semiotics and system theory offers a more plausible model of evolution that can explain the emergence of mind" (Brier 2013, p. 221–222). Yet, for cybersemiotics, the evolution of consciousness can only be explained by the embodiment of *language games* in humans and *sign games* in other species (Brier 2009).

A semiotics approach, using the tools of complexity sciences, enables the observation of the emergence of patterns and allows for them to be formalized. Ethnographic work has shown these cultural patterns, but the reasons for the emergence of new properties has remained unknown. Social institutions like rituals are characterized as a set of different states of things, people, and activities. They collectively constitute a complex communication model with features susceptible to being observed through a graph or network model. These network models could formalize the compensatory changes and continuities within society. However, from our point of view, society is not a network. Graphs and networks are merely the tools for scientific observation and representation of cultural properties. For this reason, the consciousness unity that we are considering is not language, but semiosis. Through network representations, we can observe its probabilistic evolution and their changes in meaning. For example, when a sign enters into the circuit of digital networks, its meaning is disaggregated and converted into something else, until it finally moves away completely from its original semiosis. The transition from original to final semiosis has nothing to do with the generative models of language, word classes, or syntactic structures; nor is it related to modular or role and reference semantics.

The systemic-semiotics method characterizes social institutions as *regular networks*, *local structures*, or *regular lattices*, or as Strogatz (Watts and Strogatz 1998; Strogatz 2001) did with the social web. The interaction of human groups in shared social spaces, such as markets, public squares and cemeteries, allows for the structuration of a type of connection among individuals, not necessarily related kinship, in *random long-range connections*—as Barrat and Weigt (2000) described on *small-world networks*—, resulting in moderately unexpected highly random behaviors where the diffusion process is the most critical behavior to research. The combined use of these two types of networks *regular* and *random long-range*, to model dynamic self-organizing systems is called *small-world networks* (Watts and Strogatz 1998). Network models require particular gathering of data, to be able to explain the emergence of a new pattern during fieldwork; that is, the point where the structure of a local network of signs establishes long-range connections to unify several local networks with specific grouping nodes (i.e., markets, churches, cemeteries and public places). *Non-random local networks* or *local networks* are the primary components, these are better illustrated by kinship structures or families. New entities emerge as a result of the contact of people and objects within the network hubs, which enables the observation of the network's behavior during the consolidation of meanings. In this way, when a network hub approaches its critical point, from the point of view of social science, phenomena are closer to the climax of the social interaction like rituals. The speed of time between an exchange of signs, people and objects increases exponentially as we approach the peak moment of the ritual (Valle et al. 2016; Mora et al. 2017; Valle and Morales 2017; Valle 2017).

From a simpler perspective, the process of transmitting information from one point to another is *communication*, but from a cybersemiotics ontology perspective, the process where a message arrives from one location to other and somebody understands it is the *communication of meaning*. Using a systemic-semiotics approach, meaning can occur in public, private, individual or collective spheres. Its evolutionary purpose is to create the necessary conditions for interaction and the transformation of sense and the matter of signs at different scales of semiotic organization. Luhmann's conception of communication is related to the theory of sign production, which Eco includes as part of his "Program of General Semiotics" (Eco 1975, 1976). For Luhmann, there is a first level of communication which allows for identifying the identity and difference of an open system. At this level, there is a differentiation between the aim, the channel of delivery, and the unit of action of the system. The second level refers to social systems which are constituted through actions. In this way, communication is always a self-referential process, since its purpose will always be to disaggregate the identity and the difference of the system (self-consciousness,) and can only do so as a social system. Consequently, communication involves an act of understanding and as the relation transmitter–receiver supports a change of their original semiosis. The act of communicating involves a variation in the original semiosis of the communicator as well as in the final semiosis of the interpreter. For the theory of socio-communication, sociocultural evolution generates a subproduct: communication. Therefore, the dimensions of meaning are reflected in objects that preserve memory, such as in the case of oral tradition, the first prehistoric ideograms, and writing systems.

For Luhmann (1995), the difference between information and an act of communication is that information disincorporates autopoiesis from consciousness in its need to acquire structure, while communication makes both coincide as a unity called communicative sign:

> Translated into our conceptual language "expression" means nothing more than the autopoiesis of consciousness, and "sense" or "meaning" means the need to acquire structure for this in the form of an intentional relation. Accordingly, there are signs with expressional value and signs without it, and there are expressions that use signs and those that do not […] *Only in communication do expressional value and utilization of signs inevitably coincide*. In communicative speech, all expressions function as signs. (Luhmann 1995, p. 145–146).

Then, for cybersemiotics, the unity of communication is consciousness across meaning. Instead, for systemic-semiotics, the unity of consciousness is semiosis. For semioticians like Charo Lacalle (2001) and Eric Landowski (1981), the concepts of *public* and *private sphere* place the medium of communication as an interface that regulates the traffic between individual semiosis. The methodological objective of these categories is "to measure the degree of visibility of the subject in the communicative processes" (Lacalle 2001, p. 23). Currently, in communication outlets hosted in social network's websites, the degrees of visibility of individuals are self-evident, whereas, over the XX century and the beginning of this century, the visibility of individuals as a concept was an empirical topic not yet comprehended. From a systemic approach, we can distinguish several scales in which "empirical individuals communicate, and systems of meaning make communication processes possible" (Eco 2000, p. 424). Provisionally, we can divide the visibility of interactions as scales of semiotic organization: culture, society, community, and kinship, which we will explain below.

Culture refers to those interactions that correspond to the set of values and standards of a social system. These values and norms act as parameters of collective order and include beliefs (religious, aesthetic, ethical, and philosophical), legal systems, political ideologies, technical practices, prevailing economic attitudes, etc. Culture polarizes strongly almost all individuals in the system, through reciprocal conditioning of behavior, which in turn, "generates the behavior and attitudes necessary to maintain global coherence, efficiency, and, in some extreme cases, ensure their survival" (François 2004, p. 145). Figure 9.4 is an example of the interactions in the cultural scale. It is a descriptive diagram of language. This type of representation is called a "sociotechnical system" by Van Gigch (1988). This example corresponds to the organization of systems, suprasystems, and subsystems in which a

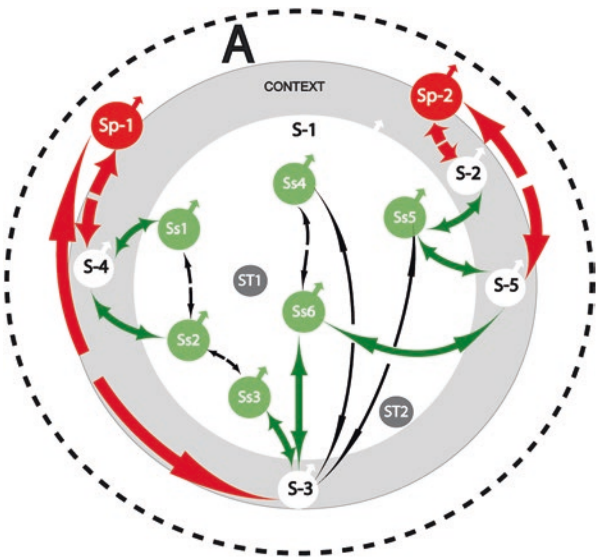

Fig. 9.4 Descriptive diagram of an open socio-technical system
Reading keys: A = Environment. Sp = Suprasystem. Sp1 = Secondary model or verbal language. Sp2 = Primary model or temporal space language. S = System: S1 = Scriptures. S2 = Mathematical language. S3 = Languages with high phonological processes. S4 = Languages with high syntactic processes. S5 = Other systems (i.e. aesthetics). Ss = Subsystem Ss1 = Mixed writing. Ss2 = phonological writing. Ss3 = syllabic writing, Ss4 = morphemic writing. Ss5 = lexical writing. Ss6 = semantic writing. ST = Technical systems (i.e. writing instruments and media). ST1 = Analogue tools, ST2 = Digital tools. (Source: Valle 2015, p. 255)

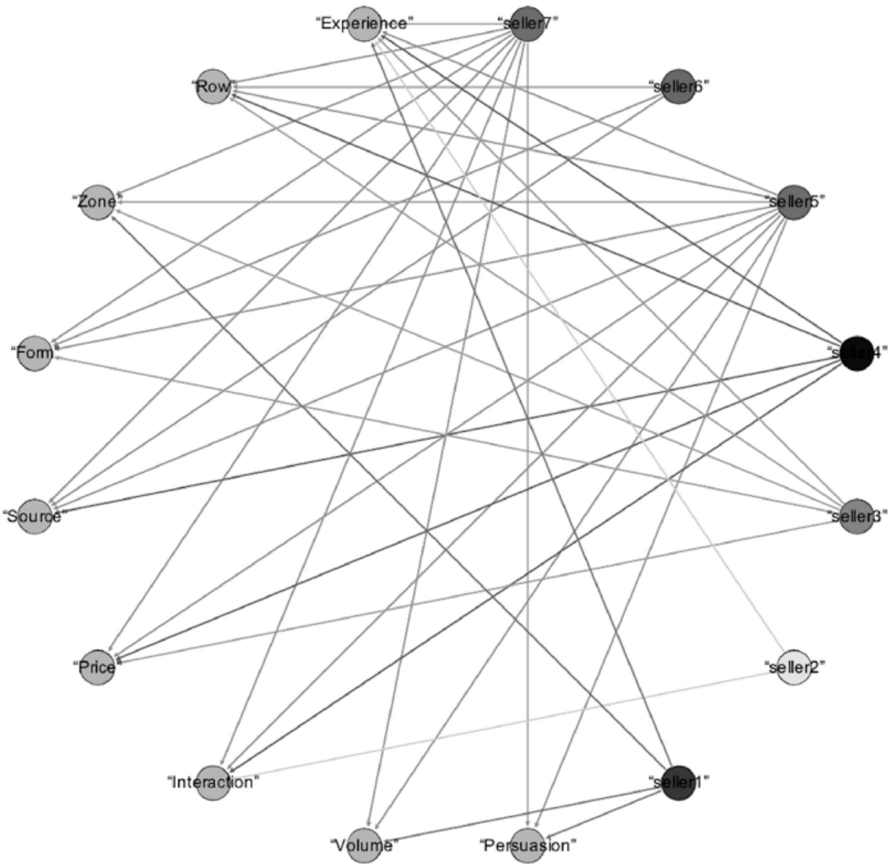

Fig. 9.5 Network model representing a system of economic beliefs in a commercial exchange Nodes represent the purchase-sale experience. Dots are the position of the stands, the origin of the products, the form and placement of the product on the stand. The parameters of order are purchase-sale interactions, the volume of merchandise, sales persuasion, price, and raw materials. Vendors are labeled from 1 to 7. The nodes of this network correspond to the parameters of order the potential buyers use as reference to choose a commodity in seven positions in a rural market or *tianguis*. (Source: Based on Mora et al. (2017)).

social institution like language operates, as well as codependences and relevant points of interaction which can be observed (Valle 2015).

Society involves the interaction of human systems using parameters of order, as shown in Figs. 9.4 and 9.5. Keynon De Greene (1994) explains the use of order parameters as follows: when applied to complex living systems, the establishment of order describes evolutionary limits and warnings for the survival of the system. The parameter order belongs to a macroscopic, emergent collective field, in which critical points of an infinite number of micro-level interactions occur. The parameter of order expresses the stochastic generation of new structural change, as well as the deterministic maintenance of the established situation or its structural constancy.

The appearance of the parameter of order represents a significant loss for the degrees of freedom at the micro-level, so that the micro-level behavior follows the parameter of order. Languages, theories, religions, political belief systems, economic belief systems, as well as scientific and social belief systems, such as the Newtonian paradigm, are exemplary parameters of order (Greene 1994).

Community, in this sense, is a type of interaction between empirical individuals that share frames of reference, similar epistemologies and the realization of similar tests to ascertain reality in a way that mutually validates their knowledge (Holzner 1968). Communities are about "the structure made of interconnected individuals who live in similar environmental conditions" (Thayer 1972, p. 122). Individual members do not "necessarily have to be identical, even if they are all of the same general types. They may very well perform different functions" (François 2004, p. 100). J. G. Miller's theory of living systems places communities as interconnected organizations which, in turn, combine with societies (Miller 1965, 1978, 1986, 1990). Thus, communities consist of a group of two or more individuals who share an identity and a common purpose, and who are committed to the joint creation of meaning through interaction (François 2004). An example of this form of organization is shown in Figs. 9.6 and 9.7.

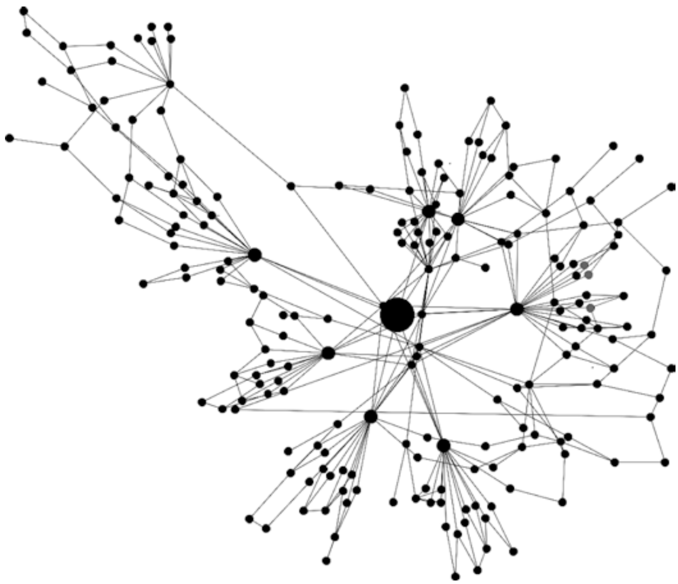

Fig. 9.6 Structure of the interaction during the Day of the Dead ritual at a cemetery in Mexico City, 2013

The nodes represent families and tombs from a single lineage; the links correspond to the interactions between them based on affinity and consanguinity relations. The most significant node represents the cemetery entrance. There is a higher concentration of individuals in that space due to the location of stalls selling flowers, candles, food, dishes, etc. (Source: Valle et al. (2016))

Fig. 9.7 Directed (left) and undirected (right) graphs of a local kinship network in Tlahuac, Mexico City municipality Source: Valle et al. (2016)

Kinship is the smallest but most the smallest and more variable, yet stable type of interaction interaction unit within a community. This type of organization regulates two types of relations, according to classic theory: consanguinity and affinity relations (Morgan 1871). However, approaches like Dziebel's (2006) and Fortes's (1949) from a systemic perspective, consider kinship as a regular or egocentric network, asserting the origin node, and focused on a single family member called *ego* (Wasseman 1994). Thus, kinship relationships in a virtual or physical community are the basis of cultural networks study, as shown in Fig. 9.8.

Using the network models in Figs. 9.4, 9.5, 9.6 and 9.7 and the definitions of each type of interaction as a scale of semiotic organization, it follows that through public and private actions, the collective as well as the individual co-occur at different scales: culture, society, community, and family, as shown in Fig. 9.8. Lacalle (2001) and Landowski (1981) establish that an individual has a degree of visibility throughout the communicative processes, which can be understood applying sociosemiotic concepts like *public* and *private*. In this sense, a social network operates with public or private individuals and public or private collectives of individuals under different modalities, as shown below. Table 9.3 illustrates the visibility of an individual through Lacalle (2001) and Landowski (1981) sociosemiotic concepts, adding social network representations which correspond to different scales of semiotic organization.

Figure 9.8 is intended to clarify how the *isomorphism of interaction* operates across different communication interfaces and impacts the communication process, as outlined in said figure and in Fig. 9.4. Isomorphisms from the biologic scale towards the social scale correspond to the *interaction* from real networks in the "Graphic representation" column versus the social network website in the first column. Signs circulate across different scales of the network; therefore, they do not

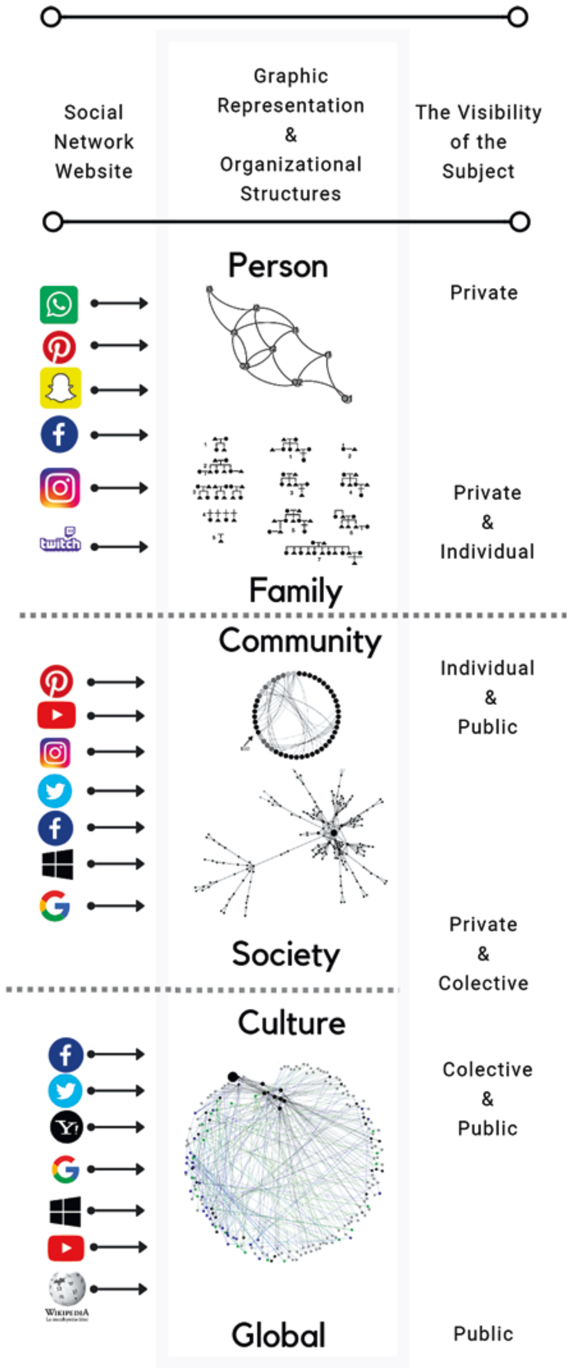

Fig. 9.8 The isomorphism of interaction and its homomorphisms
Note that the social network website Facebook operates across all scales, and consequently, the intimacy, privacy and anonymity of individuals are exposed. For this reason, other social network website where intimacy is not at risk have become more popular among young people. (Source: Elaborated from Valle (2017))

Table 9.3 Visibility of an individual throughout visual communicative processes

Empirical individual	Sociosemiotic concept	Communicative process	Social network website
Individual	Private	Private diaries	Facebook, Snapchat, Twitch, WhatsApp
	Public	Public figure	Twitter, Instagram, Facebook, Tumblr, Flickr
Collective	Private	Community intimacy, closed user groups	Chat services: WhatsApp, Skype, Facebook, Pinterest, Twitch, Rabbit, Ustream.tv, Go Meeting, Bluejeans
	Public	Public opinions Expert opinions Amateur opinions	YouTube, Facebook, Flickr, Blogs, Tumblr, News, Rabbit, Ustream.tv

Source: Elaborated from Lacalle (2001, p. 23)

have the same communication level or share similar interactions, resulting in sign meaning not being the same as in their original semiosis. The homomorphisms[7] of interaction are individual–private, individual–public, collective–private, and collective–public, all of which determine the type of semiosis and the visibility of individuals. Interaction occurs within culture, society, community and family, that is, regular networks within semiotic organization. Figure 9.8 also illustrates the qualitative aspects referring to the nodes and their meanings (Figs. 9.4, 9.5, 9.6 and 9.7), and quantitative features such as nodes of influence involving objects, persons or signs as well as their degree of connectivity. The behavior of interactions is represented as an isomorphism of interaction network along with its homomorphisms.

Cybersemiotics advances that interactions are necessarily evolutionary, which is also congruent with the systemic-semiotics approach. Within the types of interaction described above, social systems are integrated and constituted. In human communication, an expression serves as evidence of autopoiesis of consciousness. The changes of connectivity across networks are proof of the need to structure communication in the form of intentional relationships with entities beyond the self.

9.5 Discussion

The process of semiosis involves many aspects that have their basis in signification theory propositions: signs undergo transformations, and transformations occur under certain conditions. Open systems always exhibit periods of growth, relative

[7] According to Vallée (1990), the multidisciplinary or transdisciplinary character of systems theory has, as its fundamental purpose, the finding of the structural isomorphisms between systems which belong to different disciplines or between representations of the same order. Wiener (1954) refers to such isomorphisms as mere homomorphisms in his cybernetics work. The search for this type of isomorphism, or proper homomorphism, has led to the concept of a model which allows for the representation of a category of systems.

stability, and decay; that is, transformations of different qualities. Those transformations are understood as their *life cycle* (Boulding 1952). Throughout the process of consolidation of meaning, several life cycles occur, and in these the evolution of signs into other signs by acquisition of meaning becomes clear, either at an individual or collective dimension. For systemic-semiotics, a directive guiding principle is the signs transduction—or semiosis—and the general rules of their transformations. In such a way, systemics and semiotics complement each other through the principles and models of the Systems Research paradigm.

Cybersemiotics developed the concept of *sign games*, which are a type of semiotic secondness which produces meaning for all living systems, as opposed to natural language or language games, and based on Luhmann's paradigm of triple autopoiesis (Brier 2013). We use we use past experiences manipulating linguistic signs to communicate our ideas on a daily basis (Peirce 1974). We also use other types of signs to convey meanings which are more complex than linguistic signs, such as clothing, tools, or body modifications (Barthes 2015); these are what, in Brier (2013), are called *sign games*. Therefore, personal taste for objects and words define us when facing a cultural community, both subtly and forcefully. However, taste is not an element of logic which can be characterized merely by its enunciation, the conformation of signs requires a given form and matter, and which depend on historical and cultural contexts. A context of choice or of fashion is a space of statistical equiprobability which, for Eco's general semiotics, is confined to a given code.

From a systemic approach, a code is a specific set of signals and interconnection rules to conform a communication system capable of transmitting messages. Hence, semiotics and the theory of codes are needed to describe the structure of the semiotic function, and the global possibilities of coding and decoding. These principles correspond to the operation domain of signs transduction, while the region of the organization corresponds to the theory of production of signs or languages (Eco 1975). Louis Hjelmslev (1987) considers that the structure of the sign system is not different from the language structures described by linguistics. Languages, in a linguistic sense, are unrestricted languages, thus, they consist of the elements and rules sufficient to provide meaning to anything. However, other forms of communication, such as theories and mathematics, are designed to represent things and objects in a certain way and under certain conditions, as shown in Fig. 9.9.

In restricted logical languages, it is possible to determine the validity of their axioms through recursive functions in their axiom system, whenever they are well defined. An example is the development of the deduction theorem (Tarski 1994). Nonetheless, if languages do not have these kinds of logical deductive properties, they are unrestricted, like most natural languages of culture. In the terminology of propositional logic, linguistic expressions correspond to cultural languages such as natural languages, three-dimensional languages, like American Sign Language, and visual, culinary, olfactory, proxemic, and materials languages. Against all theoretical predictions, from the perspective of variety organizing domain, restricted languages have properties identical to those of unrestricted languages (Tarski 1944, 1994).

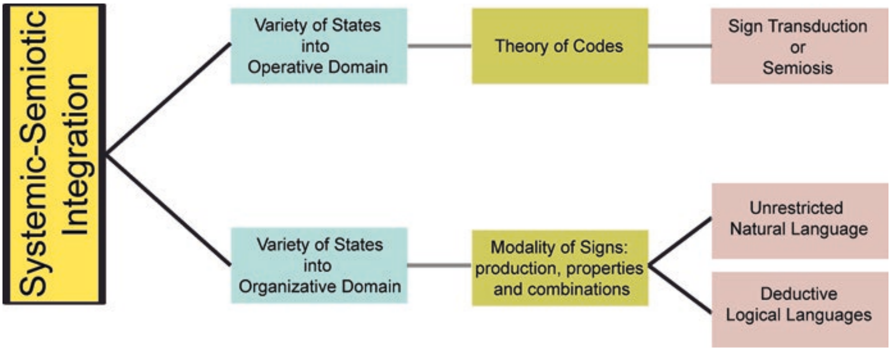

Fig. 9.9 Systemic-semiotics integration

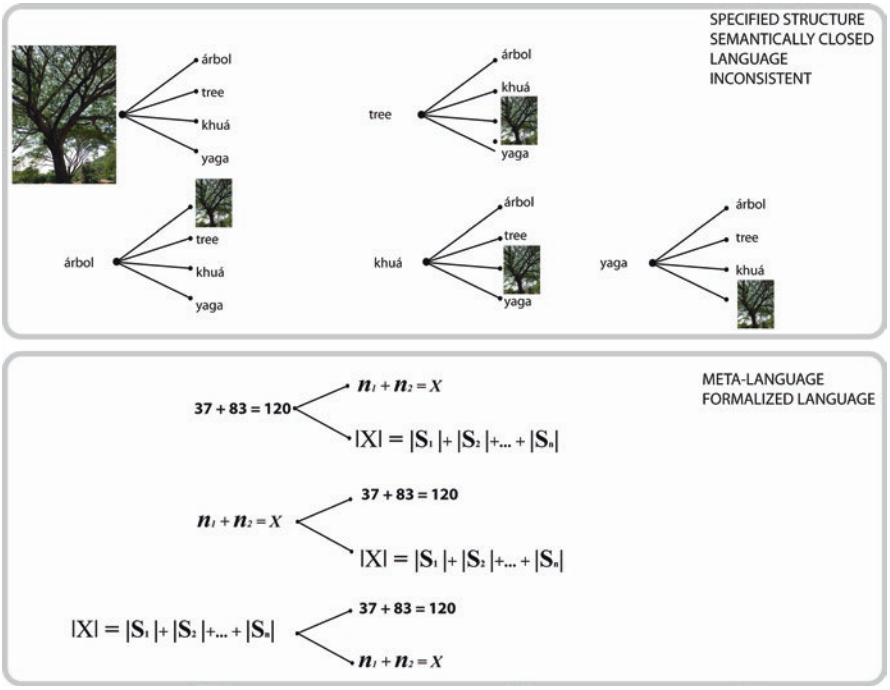

Fig. 9.10 Metalanguage external to the object–language
Source: Author

For example, every linguistic expression, such as 'árbol' in Spanish, can be translated into Otomi, English, or Zapotec, and vice-versa, as shown in Fig. 9.10. However, to read a mathematical formula, you need to have knowledge of logical structures inherent to the syntax rules of the deductive system. Specified languages are the languages that belong to the class of deductive systems; those with formalized primitive terms, rules of definition and rules of inference (Tarski 1944).

Linguistic languages have their words, laws of specification, and reasoning, and closed-semantic definitions. This last term is relevant because the idea of *true* meaning depends on who makes the enunciation and where (historically). Figure 9.10 represents the relations between the expression of a semantically closed language (above) and a formal language (below). The first has a combinatorial metalanguage and a hierarchy of communication. The object-language occupies the position of the initial node (the root node from which the branches in the trees scheme extend). The internal structure in both examples holds the relation between an initial and a final node, whose combinatorial principle is equal to the combination factor. In both cases, the directed graphs schematize the relations of semiosis through metalanguages. The cybersemiotics approach does not consider metalanguage as an analytical concept, which is logical since metalanguage analysis is a reductionist method.

The complexity of metalanguages lies in the fact that their function within an object-language is the interpretation of semiosis regarding the social, cultural and historical experience of the interpretant. In some way, it carries psychological aspects which are always difficult to formalize. In certain formal languages, open semantics prevails only for highly abstract and general properties, and this in turn, makes open semantics only applicable to defined objects and processes (i.e., a square, a circumference, a line, a point, or arithmetic operations, etc.) There is no closed-semantics of sociocultural-historical order and, therefore, metalanguages are not required to reach necessary conclusions. In fact, in a deductive system, there is not semantics *per se*, since its axioms and concepts have the property of being applied to many types of objects, regardless of their categories, material, or formal qualities. Thus, its internal design supersedes the combinations of its defined terms, with the intervention of its rules of definition and inference. By contrast, in closed-semantic systems, to define the combinations of terms, historical temporality intervenes. Hence, those linguistic languages are, from the characterization of logic, semantically closed and inconsistent, and always require a metalanguage to clarify the ambiguities of their signs (Tarski 1944). Cybersemiotics faces this problem when it does address language from linguistics and characterizes language games as a linguistic problem.

However, when we investigate language from a cultural perspective, as a set of semiotic systems, it involves two behaviors: the maintenance of meanings, and their transformation-adaptation. The maintenance and actualization of definitions occur through self-reference, as posited by cybersemiotics and Luhmann's theory. While the transformations happen according to autopoiesis. The combination of both processes renews the logical limits of the semiotic system, giving force and identity to the autonomy of the object–language regarding other metalanguages inherent to culture. Then, the most critical property of the semiotic system (S-code) is the capacity to absorb the variety of external states, new things, external elements to the self-referential system, and the autopoietic processes from which they emerge. In this way, if a system is designed to capture a large variety of states, it has a more prominent adaptability and capacity to deal more effectively with the natural tendency to entropy: the higher the information as a measure of order, the higher the influential capacity of a semiotic system (S-code) has to be to encode the variety of states of the world through messages, and the better chances it will have to adapt and assimilate external disturbances in the form of conscious systems. In this way, theoretically speaking, culture is a conscious superorganism. Based on these considerations, cybersemiotics and the systemic-semiotics approaches cannot be part of the program of general semiotics for Semiotic Research, described so painstakingly by Umberto Eco, nor are they part of particular semiotics in linguistics.

The systemic-semiotics method described here is not the only possibility for the formalization of culture, nor the most accurate path that semiotics should follow in its dialogue with transdisciplinarity. Yet, its purpose is to integrate the diversity of principles and theoretical perspectives of semiotics to express, through formal models, the process of acquisition of meaning. The constitution of a quantitative semiotics of sorts is not of a mathematical order, as the reader might verify throughout the last section. However, the fundamental ideas of these sections have their basis on the "Methodology of Deductive Sciences" by Alfred Tarski, who shared a common logical-semiotic knowledge with Roman Jakobson and Louis Hjelmslev. Nor is this a framework which announces axiomatic semiotics proposals to be tested or constituted as rules, laws and theorems. It is a systemic-based methodology for the recognition of behavior patterns across different varieties of states of semiosis. In this sense, a quantitative semiotics is a particular semiotics for transdisciplinary Systems Research. One of its methods is quantitative and it pursues concrete results in order to identify the extent to which our scientific tools allow us to make the processes of signification measurable. The path we follow in this text starts from the epistemic aspects of the system as well as the concepts of variety which, in our opinion, are fundamental in furthering the development of a systemic formalization of semiosis. On the other hand, cybersemiotics is an ontological basis and guidance for our ideas and scientific intuitions about the grounds of evolutionary consciousness. It is a general semiotics for transdisciplinary Systems Research.

Systems Research is divided in three categories: Systems Thinking, Systems Science and Systems Engineering. The cybersemiotic approach is an ontological foundation of Systems Thinking, and its aim is the research of consciousness. Consequently, the hypothesis is that the unity of semiosis is consciousness and language. The systemic-semiotic approach is a basis for Systems Engineering, and its aim is to learn about semiosis and the governing principles of human intelligibility. Accordingly, the hypothesis is that the unity of consciousness analysis is semiosis evolution. Eco's *A Theory of Semiotics* (1976) has been a very important intellectual tool for the logical and semiotic foundation of several multi-disciplines that were born during the twentieth century. The concepts and definitions brought together in this work are the basis of developments in many disciplines. However, Systems Research has managed to define a common object of study for transdisciplinary semiotics: open systems.

The cybersemiotics approach enables an understanding of social systems and culture as socio-communication (instead of following Eco's theory of sign production). And systemic-semiotic tools, like quantitative semiotic methods, allow us to identify the probabilistic evolution of meaning (disregarding Eco's theory of codes). The former can be sustained in a pure philosophical dimension, whereas the latter is necessarily classified as methodological application. Naturally, the definitions of information, entropy, open system and semiosis as units of systemic-semiotic analysis are not exclusive to this approach; it is only a methodological support. Moreover, the formalization of graphs and networks is an attempt to show the enormous capacity of abstraction within the relational properties between entities. We take these epistemic concepts from the work of Peirce, Euler and Listing; however, along with Listing, and in the philosophical work of Peirce, we find the first characterizations for a formal language of signs as monadic, dyadic, triadic, and poliadic relations, which Peirce called *existential graphs*.

The possible formalization of culture and the development of a true artificial consciousness necessarily requires the laws of mechanics and a precise description of the ontological processes which enable the emergence of life and consciousness, and which prove for a fact that it is essential to return to philosophy, except that this type of philosophy must be transdisciplinary, as does its field of research.

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Chapter 10
Human-Computer Interaction Design and the Cybersemiotic Experience

Claudia Jacques

Abstract Advances in artificial intelligence and ubiquitous computing are expanding human-computer interaction (HCI) in everyday life; turning phones, TVs, cars, etc., into computer interfaces. Such changes affect how humans perceive and interact with digital information. Influenced by Marcel Duchamp's conceptual-interactive art experiments and Roy Ascott's technoetic art, this text deploys Søren Brier's Cybersemiotic framework to bridge practice and theory. Cybersemiotic provides a powerful framework for comprehending and interpreting changes in human experience and consciousness wrought by the digital revolution. It achieves this by enabling an understanding of humans as complex adaptive systems; consequently, anything that involves or is involved with humans becomes an integral part of the system. A practical implication of this statement reveals the need to consider all internal and external variables within interactive hybrid environments. Even such minor factors as slow Internet connection or inadequate text size affects how human users perceive information or relate to an interface and consequently to the whole system. Through the lens of the Cybersemiotic a series of visual representations are introduced to highlight the interactions among user, information and interface, here addressed as meta-environment, with the potential for an ever-changing system, demonstrating the manner in which a change in one element affects each and every other part of the system. The analyses of the elements of the meta-environment reveal characteristics of a complex adaptive dynamic system promoting the expansion of human knowledge and consciousness here called Cybersemiotic Experience.

Keywords Creative act · Consciousness · Cybersemiotic experience · User-interface design · Human-computer interactions · Interactive hybrid environment · Meta-environment · Roy Ascott · Semiotic dance

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10.1 Introduction

"Alexa, play WNYC!"[1]

Alexa[2] is the latest addition to my collection of digital household appliances. "She"[3] is the Voice Service used in the Amazon Echo family of gadgets intended to mediate our every interaction with the world. Alexa is a multimedia servant waiting for our voice commands to deliver facts, switch the lights, open the front door, snoop on the children, find the keys, remind us of our overdue tasks, or whatever new skills the system can learn from us and that we have the patience to implement. In my household, the concept of using voice commands instead of a graphic interface to perform mundane tasks seem excitingly appealing, especially since my husband suffered a vision impairment in 2016 which has made navigating through simple tasks such as inserting a key in a door lock daunting. A native of Brooklyn, New York, and a scholar of African-American literature, my husband[4] has no problem communicating with Alexa. He knows the correct words to use, has the proper American English accent and intonation, and can think linearly, just like she does. I, on the other hand, have a very hard time interacting with her. The fact that I speak with a heavy Brazilian accent seems to bother her immensely as she more often than not dismisses my commands or performs a completely different "action"[5] from what I requested.

Being dyslexic,[6] having ADHD,[7] and suffering from hearing loss add a level of complexity to my interactions with Alexa that seldom falls short of being extremely frustrating. The truth is that the problem is with me. As a designer of interactive

[1] WNYC is the name of a local National Public Radio—NPR—station in New York City. http://www.wnyc.org/

[2] Amazon Echo Show is the proper name of this gadget. Detailed information about Amazon Echo and the different skills the Voice Service Alexa can potentially learn are documented on Amazon's website. It offers videos and detailed information on the Echo family (https://www.amazon.com/Amazon-Echo-Bluetooth-Speaker-with-WiFi-Alexa/dp/B00X4WHP5E)

[3] Here is an example of how the language of embodiment applied to the digital world is, at a minimum, misleading. *It* should be the proper pronoun used to address and describe the cloud voice server named Alexa, but the entire discourse surrounding the voice server intentionally leads the user to embody the experience as relating to a woman.

[4] Richard A. Courage, PhD., *The Muse in Bronzeville: African American Creative Expression in Chicago, 1932 to 1950* (2011, Rutgers University Press) and *Root, Branch and Blossom: Social Origins of Chicago's New Negro Artists and Intellectuals* (forthcoming, University of Illinois Press).

[5] Here is another example where the language of embodiment applied to the digital world seems misleading. How can an inanimate box which processes bits of energy deliver an action? The word *content* seems more appropriate to me since it refers to digital information, but the context of the sentence gets lost.

[6] "People with dyslexia have been found to have problems with identifying the separate speech sounds within a word and/or learning how letters represent those sounds, a key factor in their reading difficulties" (https://dyslexiaida.org/dyslexia-basics/).

[7] ADHD or Attention Deficit Hyperactivity Disorder "is a brain disorder marked by an ongoing pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or develop-

hybrid environments, I can attest that I am, more often than not, far from the optimal user whom interface and user-experience designers design for; Amazon Voice Service doesn't seem to change this reality. The combination of my disabilities has a great impact on my short-term memory, affecting how I retrieve words and compose sentences; spoken commands are not the most appropriate or effective form of interaction for someone like me. Parallel to that, I experience severe high frequency hearing loss, making female voices hard to hear. The scenario of a person who is hearing-impaired, dyslexic and has a short attention and memory span dealing with Amazon Echo fits perfectly as the premise of a comic TV skit but not as an optimal example of human computer interaction.

The reality is that we can't escape the phenomenon of ubiquitous computing, and human-computer interaction (HCI) permeating every aspect of life and mediating how we perceive and interact with the world (Ascott 2005, 2007, 2008; Lovejoy 2004). But just like my personal experience with Alexa, new users of such gadgets frequently have to learn new ways to interact with the interface (whether a watch, computer application, website, car, refrigerator, etc.) usually experiencing dissociation between the conceptual potential of the medium and our actual experience of it. The question arises: What exactly is missing from this process of meaning creation promoted by technological innovations? How can we optimize such exchanges? It is clear that we are in a transitional era and as art historian Margot Lovejoy (2004) points out, "Consciousness of the way the world is understood changes at different moments in history relative to the available knowledge of that period. A major shift in consciousness can change the premises about how we should seek to understand the world, what is important to look at and how we should present it" (p. 13).

Based on the philosophical framework of Cybersemiotics (see Fig. 10.1), this essay employs an aesthetic analysis to explore the cultural and perceptual shifts leading to and resulting from interactive hybrid environments such as Alexa, and it proposes ontological and methodological reconceptualization of elements and relationships involved in such environments.

10.2 Contextualizing Interactions

In his 1957 "Creative Act" lecture, Marcel Duchamp established the concept of interactivity introducing a pseudo-arithmetical equation to explain the relationship between artist, spectator, and artwork. Aiming to stay neutral in judging the value of the work, he called the artwork the "art coefficient" [Ac], which reflects the difference between the artist's "unexpressed but intended" [UbI] concept and the "unintentionally expressed" [UE] work (product).

UbI – UE = Ac

Creative Act Equation

ment" (https://www.nimh.nih.gov/health/topics/attention-deficit-hyperactivity-disorder-adhd/index.shtml).

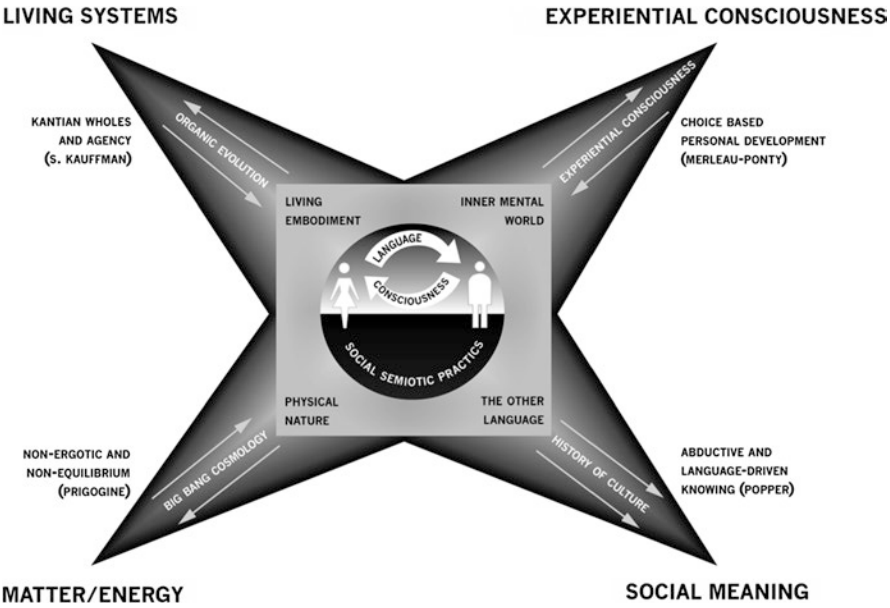

Fig. 10.1 Søren Brier's Cybersemiotic Star (2008, redesigned by Jacques in 2013). (Used with permission)

> This "art coefficient" is a personal expression of art "`a l'état brut," that is, still in raw state which must be "refined" … by the spectator … [who] experiences the phenomenon of transmutation; through the change from inner matter into a work of art, an actual transubstantiation has taken place, and the role of the spectator is to determine the weight of the work on the aesthetic scale. (Duchamp 1957, p. 139)

Duchamp's eagerness for interactivity is seen in his ludic interactions with the spectator, questioning form and content, and consequently meaning, extended beyond visual arts into language. Throughout his career, Duchamp's use of signs was a constant and significant element. It was a means of converting his static artwork into dynamic dialogue (interaction). As Sanouillet and Peterson (1989) states, "Duchamp's subversive fervor has been directed against language. We will see how he intends to re-form (not reform) our most common means of expression" (p. 5). Sanouillet goes on to say that Duchamp's intention was to give "to each word and each letter an arbitrary value to the point of total divorce between the expression and the expressive content which we customarily attribute it" (p. 6).

Even though Joselit (1998) attempts to connect Duchamp's playful usage of language to Saussure's signified–signifier (concept-word) dyadic understanding of semiology (Chandler 2007, p. 14; Cobley and Jansz 2012, p. 21), his analysis actually reinforces Duchamp's aim of reflecting triadic relationships, and he proposes "to incorporate three interrelated levels of exchange: the linguistic, the economic, and the erotic" (Joselit 1998, p. 34). Thus, by attributing value to Saussurian dyadic semiology, Joselit inadvertently reflects Charles Peirce's triadic theory of signs or semiotics. "Whereas Saussure's sign (signified/signifier) needs to combine with other signs to take part in the flow of meaning, Peirce's version of signification has an in-built dynamism" (Cobley and Jansz 2012, p. 25). Peirce's semiotics refers to the study of signs through a triadic relationship among the "[1] Representamen (the sign itself) which has a relation to an [2] Object, which relation entails an [3] Interpretant. [In other words,] the sign or representamen is quite simply, something which stands to somebody for something in some respect or capacity" (Chandler 2007, p. 14; Cobley and Jansz 2012, pp. 21–22). Peirce's semiotic thus explains Duchamp's readymades.

Duchamp's readymades questioned the meaning of art, bringing to light the possibility of an object representing and meaning different things, both for the artist and the spectator. Artist and spectator become co-creators exchanging passive and active roles as meaning creators and vehicles of meaning (see Fig. 10.2). Take for example the case of the *Fountain* (1917), a stand-alone porcelain urinal which Duchamp signed "R. Mutt" and titled *Fountain*. The porcelain receptacle (object) which we call urinal (representamen) is known as a place for men to urinate (interpretant) yet, by signing "R. Mutt" and re-titling the object *Fountain*, Duchamp introduces a new art object (interpretant). In turn, this new meaning (interpretant) becomes the sign-vehicle (representamen) for the spectator who by reading the title can choose to embrace the object as an art object, thus expanding the creative act and the relationship among artist, artwork and spectator to a dynamic dance among object, meaning creation (representamen) and meaning (interpretant), (see Fig. 10.3). This semiotic dance[8] between representamen and interpretant is what makes the object tangible and knowable, allowing for this relationship to be expanded even further by the understanding that individually changing any of the expected elements in this triadic relationship also affects the outcome of the whole exchange[9] (see Fig. 10.4).

Figure 10. 2. Creative Act scenarios analyzed under columns: "unexpressed but intended" [UbI] concept, the "unintentionally expressed" [UE] and the "art coefficient" [Ac] in the production of meaning. In Scenario I only the artist interacts with the artwork in raw state but without a spectator the work doesn't transmute or transubstantiate into Ac (new meaning.) In Scenario 2 both artist and spectator interact with the artwork in raw state but as the spectator doesn't engage with the artwork, it stays in raw state. The spectator's feedback to the artist reveals that the artwork doesn't promote the Ac. Scenario 3 represents the ideal Ac, where artist and spectator interact through the artwork and transmute and transubstantiate the work into Ac, and both experience new meaning.

Semiotic implications may also be observed in Duchamp's use of language. Playing with the meaning of words, he worked with Peirce's triadic semiotics[10] by questioning the *object* (the actual brute fact, word–index associated with Secondness) to change its *representamen* (potential for meaning–symbol creation and associated

[8] The term semiotic dance was proposed in an informal conversation by Jeanette Bopry, editor of *Cybernetics and Human Knowing* journal (Jacques 2018).

[9] This understanding will later be crucial on the analysis of the elements in interactive hybrid environments.

[10] Joselit (1998) attempts to explain Duchamp's usage of language through Saussure's dyadic signified-signifier semiotics. Duchamp's triadic usage of signs in the creative act, along with his writings and readymades through object reinterpretation, coupled with the usage of language in his titles seem to be evidence that if he was not directly knowledgeable of Peirce's understandings of signs–semiotics, he had at least the same triadic understanding of signs. A deeper investigation of this matter is not relevant for this research but it is an attractive future research.

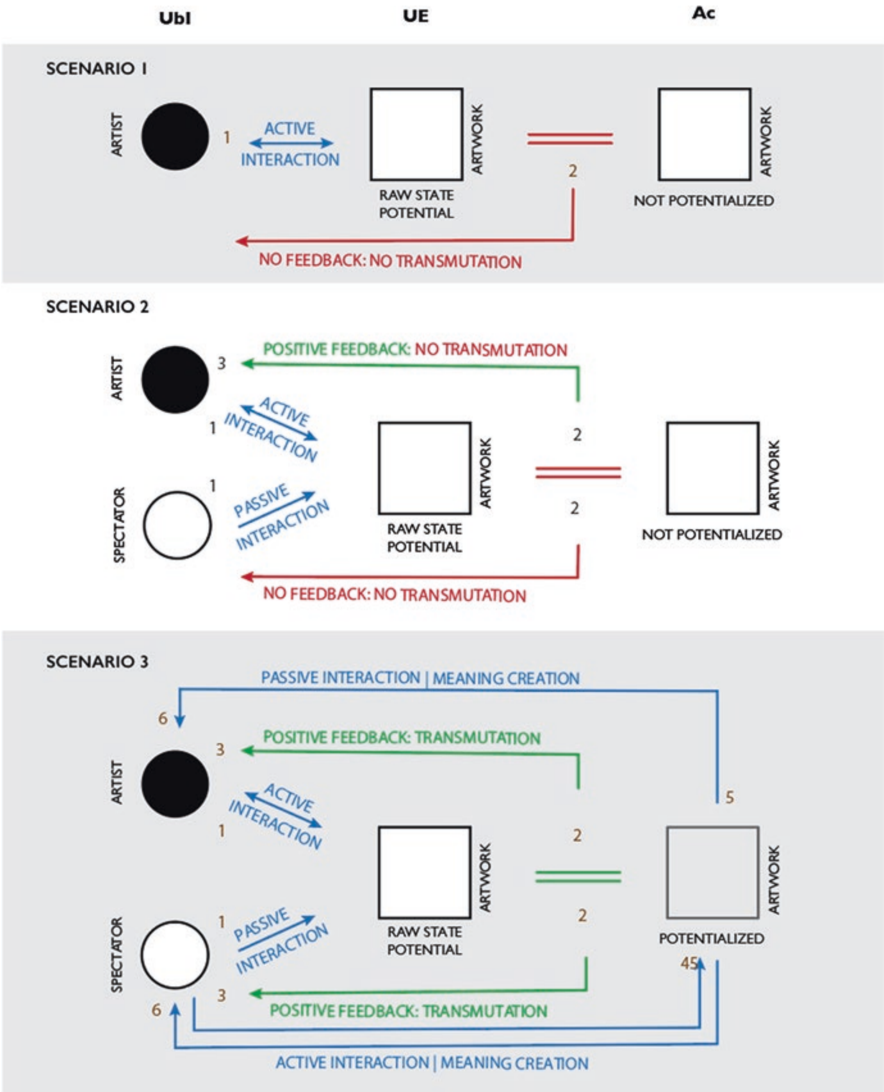

Fig. 10.2 Creative Act scenarios analyzed under columns: "unexpressed but intended" [UbI] concept, the "unintentionally expressed" [UE] and the "art coefficient" [Ac] in the production of meaning. In Scenario I only the artist interacts with the artwork in raw state but without a spectator the work doesn't transmute or transubstantiate into Ac (new meaning.) In Scenario 2 both artist and spectator interact with the artwork in raw state but as the spectator doesn't engage with the artwork, it stays in raw state. The spectator's feedback to the artist reveals that the artwork doesn't promote the Ac. Scenario 3 represents the ideal Ac, where artist and spectator interact through the artwork and transmute and transubstantiate the work into Ac, and both experience new meaning

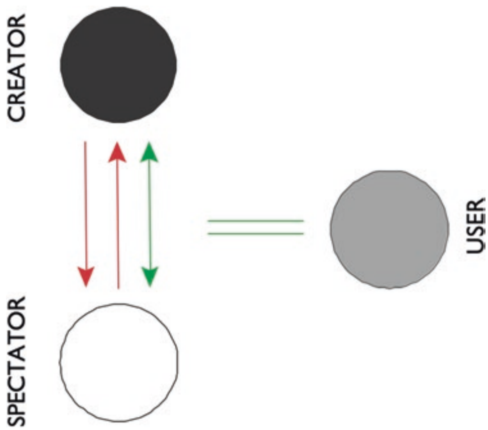

Fig. 10.3 Representation of the process in which artist and spectator collaborate as co-creators of meaning: user based on Duchamp's creative act

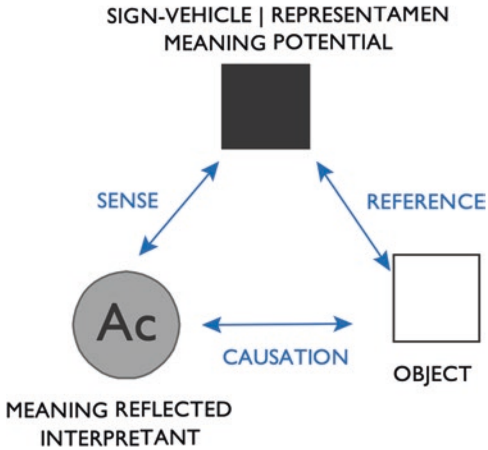

Fig. 10.4 Semiotic Interaction. Duchamp's Creative Act seen under Peirce's semiotics

with Firstness) to change the *interpretant* (what we associate with– icon, quality given to the object, Thirdness). The title *Fountain* changes the denotation when used to represent a urinal, in this case, changing how the spectator perceives the objects being re-presented by Duchamp. Removing the object from its context and attributing a new name (representamen*),* Duchamp "altered the object's identity and value" (Stile and Selz 1997, p. 804) offering to the spectator a new representation (interpretant). Just like Peirce's semeiosis, Duchamp's interplay of object, representation, and meaning is not static. Once the spectator starts to perceive the object with a new meaning, this object becomes an object d'art (representamen) with endless possible representations (interpretants) (Chandler 2007, p. 31; Cobley and Jansz 2012, p. 25, Zics (2014, n.p.). This semiotic dance reflects Umberto Eco's (1989) open artwork—Semiotic Openness—which presents the concept of the active spectator and as such a multiple semiotic creation process yielding the possibility of multiple meanings, the possibility of infinite relationships between spectator, artwork, and artist (see Fig. 10.5).

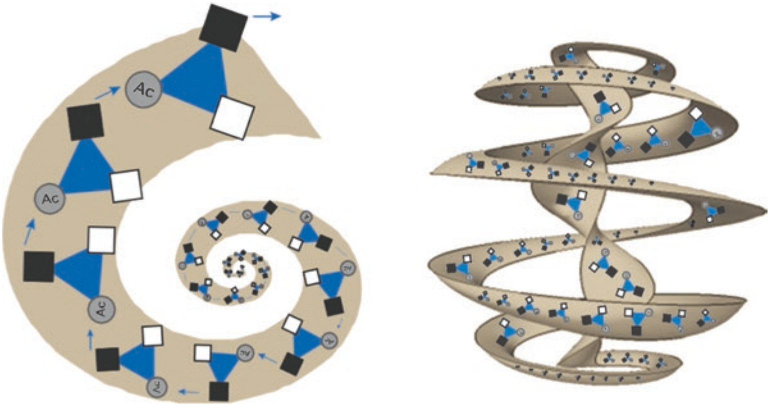

Fig. 10. 5 Semiotic Dance visualization where artist and spectator become co-creators of meaning. The unlimited semiosis interplay reflects a mobius spiral in constant change yet circumscribed by the user. Left, top view; right vertical view

10.3 A Technoetic Aesthetic

Duchamp's desire to exchange with the spectator is today the foundation of any and every human-computer interaction. The advent of new telecommunication tools has been quickly adding new possibilities for rendering aesthetic *meaning* and *intentionality* in artmaking.[11] Lovejoy (1997) revisits Walter Benjamin's essentially dystopian view of the influence of technologies on aesthetic practices and a resulting loss of meaning and intentionality. But Lovejoy counterbalances Benjamin's ideas with Marshall McLuhan more utopian views of the aesthetic potential of new telecommunications media, concluding that "[T]he computer shattered the existing paradigm of visual representation by converting visual information about reality into digital information about its structure, modeling the visual rather than copying it and allowing for interactivity as a new aspect of representation" (p. 213). Lovejoy (1997) suggests that in modeling visual representation and converting visual into digital information, interactivity emerges as a vitally creative aspect of representation, "defining a new arena of consciousness and feeling" (p. 214).

It is in the realm of the digital and telecommunications that Roy Ascott (2005) brilliantly refocused representation toward a more balanced relationship among subject matter, form and content, while also expanding the aims of representation to embrace interactive systems. "Of the myriad universes of discourse that constitute

[11] These two terms refer back Lovejoy's (2004, p. 15; 1997, p. 14.) quote shared under the subsection 2.3.1. Introduction:

"The way we see is shaped by our worldview, which governs our understanding of what representation is. Thus, we can say that representation is a form of ideology because it has inscribed within it all the attitudes we have about our response to images and their assimilation; and about art-making in general, with all its hierarchies of meaning and intentionality" (2004, p. 15; 1997, p. 14).

whole cultures and countries, only those open to change and adaptation are likely to survive the step change in evolution exerted by scientific development and technological innovation. If countries and communities are to avoid homogenization in this process, it will need to be a syncretic process that maintains the plurality of difference" (n.p.). Attempting to engage in an active communication with the spectator, Ascott's artworks and conceptualizations often directly reveal his thought and artmaking processes. This inherently self-disclosing practice (reflecting Pasmore's influence) shows Ascott's engrained understanding of second order cybernetic communication processes and its relevance in his work as feedback to engage and contextualize the spectator's interpretation (Ascott 2007; Shanken 2007). Shanken (1997) explains the core insight of cybernetics in this manner:

> Cybernetics introduced a method for thinking about the relationships amongst the various interrelated elements of a system, concentrating on the regulation of these elements in order to control the outcome of the system. Primary to the management of the system was the ability for each element to offer the system feedback about its own status. In this way, the elements could communicate with each other and provide information which would enable the regulation of the system as a whole (n.p.).

As interactivity, information and ultimately meaning are the results of this new form of representation of reality (Lovejoy 1997), this dependency on the spectator, creates the assertion of a need for a holistic and integrated consciousness experience associated with qualia. As Ascott (2007) points out, it is "the artist's imperative to explore every aspect of new technology that might empower the [user] through direct physical interaction to collaborate in the production of meaning and the creation of authentic artistic experience" (p. 357). Ascott uses a four-sided model to represent the different aspects of interactive art and its influences on the construction of human consciousness as a complex adaptive system. This syncretic reality, as Ascott calls it, is composed of physical, vibrational, tele- and apparitional presences. These four presences are merely starting points as the final goal is a syncretic understanding of the self (see Fig. 10.6). The intended outcome of this complex multilevel dialogue is what Ascott calls a technoetic aesthetic. "Technoetics is a convergent field of practice that seeks to explore consciousness and connectivity through digital, telematic, chemical or spiritual means, embracing both interactive and psychoactive technologies, and the creative use of moistmedia" (Ascott 2008, p. 204).

A further development of syncretic, anthropophagic aesthetic practice and process may be seen in Ascott's understanding of the shift from artistic visual representation to behavioral experimentation (Ascott 2007, p. 110.) This is expressed through an interactive, participatory art experienced as a "perpetual state of transition" (Ascott 2007, p. 111). It is a liminal zone that relies on second-order feedback exchange processes among artist, medium, and spectator and that opens doors to telematic art, where isolated interactions or systems can interact with other systems promoting broader systems of connectivity. These in turn allow for the inclusion of digital technologies as tools and means of exchange, augmenting human perception to cyberperception. A technoetic art is the result, one that you see, touch, feel, or sense and are part of, that enhances and expands perceptions allowing for this perception to be swallowed, digested and returned as a unique experience or qualia.

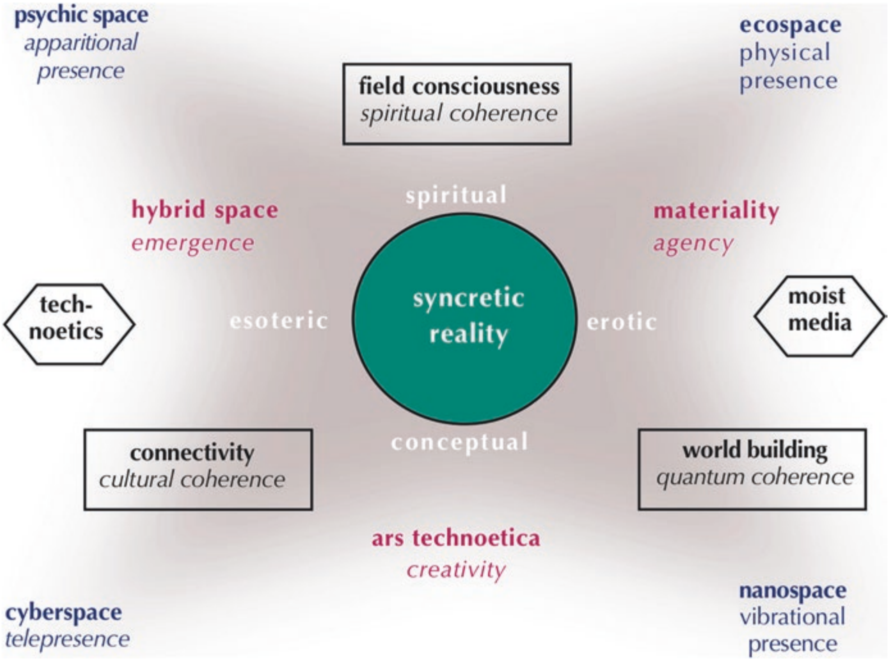

Fig. 10.6 Syncretic Reality (2008) slide reproduction shared at Plymouth Art Centre show The Syncretic Sense, Roy Ascott (used with permission)

The creation of interactive hybrid environments is concerned with systems where artist, spectator, and medium generate and exchange perceptions and processes. It focuses on expanding the creative act to the spectator-user. The user's understanding of the world—semiosis—is what changes perception of the artwork. It's what connects the syncretic, technoetic art of Roy Ascott with the cybersemiotic philosophy of Søren Brier (see Figs. 10.1 and 10.6). The aim of syncretic art is to promote new perceptions, with the capability of a holistic experience integrating diverse processes and perceptions.

10.4 Interactive Hybrid Environments

Addressing Roy Ascott's (2010) call for artists "to navigate consciousness and create new structures, images and experiences within" (p. 4) their art practices exploring the concept of cyberperception,[12] it is necessary to define interactive hybrid environments, contextualize the phenomena surrounding the development of such

[12] *Cyberperception* is defined as "the emergent human faculty of technologically augmented perception" (Ascott 2007, p. 376).

environments, and define their elements, calling attention to the ontological and methodological issues that arise from attempting to accord them appropriate and balanced attention. Interactive hybrid environments should be understood as aesthetic constructions aiding human attempts to navigate consciousness. *Interactive* refers to the fluid exchanges between its elements as well the collaboration between artist and spectator dynamically creating meaning through perceptions and/or processes. The word reflects Ascott's understanding of interactive art as a "cybernetic system, consisting of [art, culture and society as interconnected systems of] feedback loops that included the artist, the audience and environment (Shanken 2007, pp. 26-–27). It also reflects Peirce's "semiotic paradigm … focuse[d] on the possibilities of meaningful communication in living and social systems" (Vidales 2017).

The term *hybrid* is inescapable when promoting cyberperception and compels us to look at these elemental characteristics: spatiality, temporality, essence, sign processes, embodied cognition, and level of dynamic complexity.

- Spatiality refers to how an element manifests as either physical (matter) or energy (digital).
- Temporality refers to the distinction between temporal and atemporal qualities, as well as synchronous and asynchronous interactions.
- Essence refers to the elements' core biological atoms or bits (Negroponte 1995).
- Sign processes refer to the linguistic-cultural-social structuralism (semiotics) and constructivism, relating to subjective or objective sign interpretation and meaning creation.
- Embodied cognition reflects how we embody information (meaning) as opposed to disembodied digital information.
- Dynamic complexity refers to creativity, aesthetic, design, usability and purpose of such environments, focusing on the predictability and linearity of their interactions (Brier 2008; Vidales 2017).

In practice, hybridity reflects the physical (atoms, hardware, peripherals, humans) and/or digital (bits, software, data transmission) characteristics; as well as how information is perceived, either as individualized meaning—qualia (perceptions) or data (processes). The term also relates to how space and time are presented, as space-time continuum where physicality may not always be linear and synchronous.

The term *environment* is essential due to the complexity of the elements and processes observed in such artworks, experienced, perceived and embodied by their users (creator and spectator),[13] revealing autopoietic systems structurally coupling human-human, human-information, information-information, human-computer, information-computer, computer-computer interaction (Dubberly and Pangaro 2015). Whether creating or analyzing interactive hybrid environments, the boundaries between artist-artwork-spectator, information and computer become fluid and translucent, making us rethink their respective roles. As Ascott (2007) argues, "Art

[13] Term *user* is elaborated later in this chapter.

does not reside in the artwork alone, nor in the activity of the artist alone, but is understood as field of psychic probability, highly entropic, in which the viewer is actively involved not in the act of closure in the sense of completing a discrete message from the artist (a passive process) but by interrogating and interacting with the system "artwork" to create meaning" (p. 179).

Interactive hybrid environments need to be detached from the concept of the artist creator where the artworks are seen as unique pieces of creative insight. Instead they should be embraced under the perspective of telematic aesthetics, where phenomenological collaborative exchanges aim for production of meaning (Shanken 2007; Ascott 2007). From a telematics perspective, the creative process is decentralized in interactive hybrid environments and as such the artistic practice becomes inherently a collaborative practice, no different in kind from exchanging on crowdsourcing environments, social networks, or content and learning management systems. Alexa, Amazon's Echo intelligent personal assistant introduced earlier, is trained by its user in the household, who asynchronously collaborates with the user-creator (designers developing the interface and its skills), making Alexa unique in the production of meaning for each of its various end users in the household. Alexa and the different social media and content management systems that employ dynamic databases, rely on the user-spectator exchange to asynchronously collaborate with the user-creator in the production of meaning. In such interactive hybrid environments, the creative process and outcomes are collaborations outputting unique meanings. Christiane Paul (2015) argues that "One of the inherited characteristics of digital art is the tension between the hierarchical structure of instructions and data sets and the seemingly infinite possibilities for reproducing and reconfiguration the information contained in these structures" (p. 179).

The potential of different meanings and relationships to the user introduced earlier as the semiotic dance is flatten out when we focus on the language of computer science employed by Paul—"hierarchical structure of instructions and data sets…information contained in these structures"— to describe human creation of meaning. Such language focuses on processes and indicates that an expansion beyond aesthetic domains is needed in order to observe and describe these environments. In 1964, Ascott recommended cybernetics as a field that would help artists ground their understanding and language when creating interactive environments because of its integrative characteristics.[14] Over fifty years later, interactive hybrid environments have permeated all aspects of life, from artistic practices to self-driven cars, video-games and watches, to name a few. This expansion broadened the areas of approach to many different fields, including biological and chemical. In this sense, interactive hybrid environments can also refer to moistmedia "compromising bits, atoms, neurons, and genes in every kind of combination" (Ascott 2007, p. 363). The challenge is to include such broad fields in creative practices while respecting the demands of scientific fields that inform such practices without reducing the sphere of creative practice. Artists and designers of interactive hybrid environments

[14] Ascott was referring to second-order cybernetics.

need a framework that allows a non-reductionist approach to the elements and processes involved in the creation of meaning.

10.5 Human-Computer Interactions (HCI)

The commoditization of digital information through dynamic databases such as Google Amazon, Facebook, and Ebay, among many others, has added greater complexity and urgency to the study of Human-Computer Interactions (HCI). In general, the study of humans and digital machines tends either to focus on logical processes, paying little attention to phenomenology and experiential consciousness or, alternatively, to focus on cognitive perceptions, disregarding self-organization, autopoiesis, and feedback loops (Brier 2008). The field of HCI seem at first to adequately address such divides in the study of the interaction between humans and digital machines, but on closer examination, we see a complex evolving system with boundaries shifting fluidly among contrasting fields, thus revealing itself to be what I characterize as pseudo-transdisciplinary field. I explain my claim in the next paragraphs.

Our understanding of HCI is continually evolving as digital technologies increasingly permeate the different domains of life, from art, media and education to transportation, security surveillance, medicine, and health, to name a few. HCI is pseudo-transdisciplinary as it borrows theories, methods and ontologies from different fields such new media, computer science, cybernetics, information systems and theory, artificial intelligence, cognitive psychology, library science, linguistics, communications theory, and semiotics, and so forth. Unfortunately, these fields do not necessarily share the same methods or fundamental views about what is involved in describing and analyzing such exchanges between humans and machines. A major influence on HCI is our need for embodiment which has made us perceive computer interfaces as extensions of ourselves, restricting digital technologies potential in expanding our perceptions of space and time beyond the linear continuum introduced in the mechanical age. HCI attempts to comprehend such diverse hybridity by offering different ways to reconcile the integration of computational processes with meaning creation. However, HCI is self-limiting insofar as it examines distinct aspects of such interaction without taking the whole into consideration. "Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them" (Hewett et al. 2009, n.p.).

Quite often HCI is the filter for discussions involving the design of digital technologies ranging from artistic practice to medical science because of its broad reach. Initially presented as a specialized concern within several disciplines and consequently framed as an interdisciplinary area with different emphases (Hewett et al. 2009), HCI does at first glance seem to be the encompassing field to which artistic practitioners should turn when working with interactive digital technologies. Artists certainly need to have a domain of this nature available in order to develop such artworks. Just as painters need to have a deeper understanding of brushes, canvases and paints, as well as light to represent value and color; artists creating interactive hybrid environments need a deeper understanding of human computer interactions in order to enhance the experience of such works.

At this point, there is a need to create a clearer distinction among the adjectives multidisciplinary, interdisciplinary and transdisciplinary employed to describe how diverse academic disciplines can be combined to create knowledge. Oxforddictionaries.com defines *multidisciplinary* as "combining or involving several academic disciplines or professional specializations in approach to a topic or problem." *Interdisciplinary* is defined as "of or relating to more than one branch of knowledge" and *transdisciplinary* as "relating to more than one branch of knowledge." The boundaries seem vague but Willie Caldwell (2015) further elaborates on such differences.

> Multidisciplinarity contrasts disciplinary perspectives in an additive manner, meaning two or more disciplines each provide their viewpoint on a problem from their perspectives. Multidisciplinarity involves little interaction across disciplines.
>
> Interdisciplinarity combines two or more disciplines to a new level of integration suggesting component boundaries start to break down. Interdisciplinarity is no longer a simple addition of parts but the recognition that each discipline can affect the research output of the other.
>
> Transdisciplinarity occurs when two or more discipline perspectives transcend each other to form a new holistic approach. The outcome will be completely different from what one would expect from the addition of the parts. Transdisciplinarity results in a type xenogenesis where output is created as a result of disciplines integrating to become something completely new (n.p.).

The examination of the proper term to define how interactive hybrid environments are created is relevant to this discussion since it summarizes the way we have been addressing the ontology and methodology employed in combining the many different fields involved in such environments. When in 1992 the Association for Computing Machine (ACM) Special Interest Group on Computer-Human Interaction (SIGCHI) developed its curricula for Human-Computer Interaction, it saw the field as interdisciplinary.

> Because human-computer interaction studies a human and a machine in communication, it draws from supporting knowledge on both the machine and the human side. On the machine side, techniques in computer graphics, operating systems, programming languages, and development environments are relevant. On the human side, communication theory, graphic and industrial design disciplines, linguistics, social sciences, cognitive psychology, and human performance are relevant. And, of course, engineering and design methods are relevant (Hewett et al. 2009, n.p.).

As a counterpoint to the understanding that HCI is an interdisciplinary field, Wania et al. (2007) introduce it as multidisciplinary, combining theories and practices from computer science, cognitive and behavioral psychology, anthropology, sociology, ergonomics, and industrial design. It is revealing that Wania et al. (2007) call HCI multidisciplinary, attesting that is a unique field with many different sub-communities or specializations. By drawing the parameters of HCI so broadly, theorists of the field attempt to prevent the design of such interactions from being divorced from the context and problems being addressed in the design (Hewett et al. 2009), yet it privileges some aspects while ignoring others in order to integrate its many domains. John M. Carroll (2003) critiques such attempts at broad scale integration in HCI in his analysis of the scientific fragmentation of the field:

> An ironic downside of the inclusive multidisciplinarity of HCI is fragmentation. This is in part due merely to the expansion of the field and its scientific foundations. In the 1980s, it was reasonable to expect HCI professionals, particularly researchers, to have a fairly comprehensive understanding of the concepts and methods in use. Today, it is far more challenging for individuals to attain that breadth of working knowledge. There are too many theories, too many methods, too many application domains, too many systems. Indeed, the problem of fragmentation may be a bit worse than it has to be. Some HCI researchers, faced with the huge intellectual scope of concepts and approaches, deliberately insulate themselves from some portion of the field's activity and knowledge. This tension between depth and breadth in scientific expertise is not unique to HCI, but it clearly undermines the opportunity for multidisciplinary progress (Carroll 2003, p. 6).

The consequences of the fragmentation of HCI are sometimes most acutely observed in the fields of neuroscience and artificial intelligence, where the same language is employed to define and describe radically different elements and processes. The following text is an example of how a language of computer science is appropriated to describe biological phenomena in an attempt to connect the two fields as if they share the same ontology and methodology. "According to the researchers, the new learning theory may lead to advanced, faster, deep-learning algorithms and other artificial-intelligence-based applications, and also suggests that we need to reevaluate our current treatments for disordered brain functionality. The brain learns completely differently than we've assumed, new learning theory says" (The Brain Learns Completely Differently than We've Assumed, New Learning Theory Says 2018, n.p.).

Flattening the two fields as if their essences are one is broadly parallel to how humans use the techniques of linear perspective to represent the three-dimensional world in a two-dimensional medium. The technique is a great solution for the problem of 3D representation but falls short of being a reproduction of reality. Such techniques are just attempts to create realistic representations of reality. This Renaissance technique has helped humans perceive the 3D world through more realistic 2D representation. It has also taught us to simplify reality and accept the absurdity of the distorted planes created with linear perspective.[15] In the case of embodying digital technologies the absurdity lies on assuming that the digital can be the unique mediator of interactions. The dissonance continues with the subject matter of phenomena, which focuses on a dyadic human-computer relationship but ignores the depth and breadth of information. Søren Brier critiques the manner in

[15] The techniques of atmospheric perspective, value pattern sizing and overlapping when employed with linear perspective help reduce the visual distortion it creates and consequently visually render more realistic representations of reality.

which technological developments not only create extra layers of complexity but also affect communications and information.

> The scientific endeavor in the postmodern age is becoming increasingly complex and transdisciplinary. Researchers and practitioners within the fields of the arts and natural, medical, and social sciences have been forced together by new developments in communication and knowledge technologies that broke the traditional limits of professional knowledge. They are further forced together by problems arising from the limitation of the kinds of knowledge that we have cherished so far. The shortcoming of traditional information and communication analysis based on data or information-flow theories is raising fundamental problems with respect to the construction and organization of knowledge systems. New concepts of communication can help us understand and develop social systems such as self-organizing and self-producing networks, and we need a deeper understanding of the ethics and aesthetics foundational to the existence of these new systems. Instead of communication of information, we might speak of a jointly actualized meaning (Brier 2008, p. 20).

A painter attempting to reproduce a landscape will spend time observing the environment and sketching what is seen in a much-simplified form in order to establish the composition. In this research study I propose to simplify subject matter in HCI by focusing on the three main elements addressed in interactive hybrid environments, so they can be defined and isolated for ontological clarification. These three elements are the user, the interface and the information.

10.6 The Meta-Environment[16]

The communicability among these three elements (user, information and interface) reveals a complex adaptive system with many levels of exchange among them. I call this relationship the *meta-environment* since it involves the processes of storing, relating, inputting, and outputting information as well as the users' actions and the many elements of the interface, such as software and hardware. The meta-environment includes the relational processes of data (information), metadata, database, applications, user interaction, and information communication existent in the triadic relationship amongst user, information, and interface. In an attempt to sketch the subject matter of interactive hybrid environments and elaborate on its elements, the ontological use of the terms user, information and interface is introduced as following.

(a) User

Duchamp's Creative Act established the inclusion of the spectator in the artistic creation of meaning, which through the lens of Peirce's semiotics reveals the potential for a semiotic dance among object, representamen and interpretant with the possibility of infinite exchanges among the artist, the artwork and the spectator. For Duchamp (1957) as well as for Ascott (2008), the artwork is only completed when the spectator is included in the process. Artist and spectator become, then,

[16] The meta-environment concept was first introduced in Jacques 2012.

co-creators of meaning and thus the terms artist and spectator seem inadequate to capture the potentiality of this co-creation process. Calling for a reconceptualization of terms due to the advent of digital technologies, Stephen Wright (2013) argues that "with the rise of networked culture, users have come to play a key role as producers of information, meaning and value, breaking down the long-standing opposition between consumption and production" (p. 1).

Artists and art historians (Ascott, Lovejoy, Paul, Shanken, etc.) use the terms spectator, participant, viewer, audience and user almost interchangeably to describe the person experiencing an artwork, but such usage obscures the potential of co-creation in the production of meaning. These terms are associated with their ontological medium, often restricting the experience of co-creation. Spectator seems to be the most widely adopted term, yet it too falls short of adequately conveying the dynamic potentiality of co-creating Duchamp's coefficient of art. In a discussion of the terms employed today to identify the people involved in the coefficient of art and consequently the passive (consumption) and active (production) roles they play, Stephen Wright (2013) acknowledges that "spectatorship continues to enjoy almost self-evident status in conventional discourse as a necessary component of any plausible artworld" (p. 60). Yet he rejects the dominant ontology of spectatorship, arguing instead that contemporary art "practices seem to break with spectatorship altogether, to which they increasingly prefer the more extensive and inclusive notion of usership" (p. 60).

The *Merriam-Webster Dictionary* defines *user* as: "one that uses." Assuming that the definition refers to one who uses something, the something used in this context is related to the interface as well as to the information. The term *user* is borrowed from HCI and computer sciences and embraced by User Interface Design (UI) and User Experience (UX) curricula, which are more appropriate foundations for the design of interactive hybrid environments. The concept of the user in UI and UX is further expanded by the semiotic view of the sign user, which reflects "Peirce's definition of the sign [as] something that stands for something else in some capacity for *someone* (or some organism) [user]. It could never leave the user" (Cobley 2010, p. 11). The user is any and every person who experiences and relates to the information and interface in any of a variety of dynamic ways. This definition is more expansive than the passive recipient of information mediated by a computer, known in HCI and Computer Science as the end-user. It includes not only the person who interacts with the interface and passively consumes digital information (end-user) but also the one(s) originally producing the interface and information. From the perspective of Duchamp's coefficient of art, *user* can refer to the passive end-user as well as the professionals developing and implementing information and interfaces, with the understanding that at a certain point the roles will change and exchange in the production of meaning—the semiotic dance.

Ubiquitous computing has been continuously thinning the line between *passive* or *end-user* and active *front* and *back-users* (designers, programmers and professionals developing interfaces) through open source and server-based applications, apps and widgets. For example, a user might be a student researching an academic topic on the web, a client doing online banking, a financier managing someone's money, a designer developing a web interface, an educator implementing an online course, a computer programmer developing an application, a teenager hacking an I-phone app, and so forth. Cybernetics[17] contributes the illuminating concept of structural coupling, which describes "recurrent interactions leading to the structural congruence between two (or more) systems" (Maturana and Varela 1992, p. 75). This concept reinforces the user's (artist-spectator) co-creation potential, which may be further considered an organism constituted in an autopoietic fashion and developing relationships of mutuality with the other elements of the meta-environment (Guddemi 2000; Bopry 2007). The user, from both a semiotic and cybernetic perspective, actualizes the potential of the interface and information (Huhtamo 2007).

(b) Information

Today, the concept of information is somewhat like the child of divorced parents who is pressured to conform to the views of one parent at a time but never both at the same time. With the advent of digital technologies, this "child" has grown up enough to be its own entity, yet the parents' lack of communication among themselves still constrains its voice from standing on its own. In this analogy, the parents are human perceptions, on one hand, and technological processes, on the other. Each offers a fundamentally different view of information. This reflects C. P. Snow's famous account of the divide between the two cultures of the sciences and the humanities. Despite the manner in which the advent of human-computer technologies and interactions have been closing this divide (Vesna 2011), information frequently appears to still be subject to a bitter custody dispute. Comprehending information as seen in the meta-environment requires that we look at communication processes through the lens of human beings, digital technologies and the exchange between human beings and digital technologies as systems. Semiotics, cybernetics and systems theories each address such processes but only through their individual lenses, which obscure as much as they reveal about the potential of such interactions.

In 1948, when introducing cybernetics, Norbert Weiner (1965) defined digital information as zeros and ones transmitted by electromagnetic signals with infinite options of decisions, communication and control. Later, Weiner (1954) advanced the.

> … thesis that the physical functioning of the living individual and the operation of some of the newer operation machines are precisely parallel in their analogous attempts to control entropy through feedback. Both of them have sensory receptors as one stage in their cycle of operation: that is, in both of them there exists a special apparatus for collecting information from the outer world at low energy levels, and for making it available in the operation of the individual or of the machine…In both of them, their performed action on the outer world, and not merely their intended action, is reported back to the central regulatory apparatus. This complex of behavior is ignored by the average man, and in particular does not play the role that it should in our habitual analysis of society; for just as individual physical responses may be seen from this point of view, so may the organic responses of society itself. I do not mean that the sociologist is unaware of the existence and complex nature of

[17] Second-order cybernetics.

> communications in society, but until recently he has tended to overlook the extent to which they are the cement which binds its fabric together (p. 26–27).

First-order cybernetics understands information as a statistical property of a particular message, but the message itself (what is exchanged and its meaning) is irrelevant to the theory (Vidales 2017). Wiener (1965) continues:

> One of the simplest, most unitary forms of information is the recording of choice between two equally probable simple alternatives, one or the other is bound to happen—a choice, for example, between heads and tails in the tossing of a coin. We shall call a single choice of this sort a decision. If we then ask for the amount of information in the perfectly precise measurement of a quantity known to lie between A and B, which may with uniform a priori probability lie anywhere in this range, we shall see that if we put A = 0 and B = 1, and represent the quantity in the binary scale (0 or 1), then the number of choices made and the consequent amount of information is infinite (p. 61).

Looking at information from a systems perspective, Claude Shannon (1949) added entropy to quantify information in any form of communication. "The concept of information applies not to the individual messages (as the concept of meaning would), but rather to the situation as a whole, the unit information indicating that in this situation one has a freedom of choice, in selecting a message, which it is convenient to regard as a standard or unit amount" (Shannon 1949, p. 100). Based on Weiner and Shannon's concepts of information, we can define information in the meta-environment as that entropic transmission of data and metadata in binary format that generates communication as a whole. Metadata is not only the description of the content but also the description of the structure of the content. Of course, using an extra layer of information to describe information is not new. Footnotes, references, bibliographies, and key words are some of the extra layers of information that have been routinely found in academic texts since long before the birth of the digital age. The index organization in a book can be considered a meta-structure describing that content. In the context of this study, digital information refers to data and metadata—as meta-content and meta-structure—and also to the ways that data and metadata together reflect digital information as a whole.

Second-order cybernetics thoroughly addresses information from a human perspective: "Information is, of course, the process by which knowledge is acquired, and knowledge is the processes that integrate past and present experiences to form new activities, either as nervous activity internally perceived as thought and will, or externally perceivable as speech and movement" (Von Foerster 2003, pp. 200–201). The shift from "the science of observed systems" in cybernetics to "the science of observing systems" in second-order cybernetics (Von Foerster 2003, p. 298) adds living systems with the potential of autopoiesis, self-organization, and the emergence of meaning (Brier 2008) to the understanding of information. Different fields approach information in different ways. In cybernetics, computer science, and natural sciences information is seen as "an objective, quantitative information concept and works with algorithmic models of perception, cognition, and communication. Semiotics, in contrast, is based in human language's meaningful communication and is phenomenological as well as dependent on a theory of meaning" (Brier 2008, p. 42).

When 2nd Order cybernetics is complemented by the semiotic study of signs and language, information and communication evolve beyond being a description of human information processes because the observer is the one creating meaning (Guddemi 2000; Bopry 2007; Brier 2008; Vidales 2017). "We could add to Wiener's statement that (in itself) 'information is information, neither matter nor energy'—that information is also not meaning until it has been interpreted by a living system" (Brier 2008, p. 76). The description of sign processes and entropic transmission of data and metadata in binary format allows for one understanding of information in the meta-environment. The creation of meaning is seen as separate from information since it relies on the user experience (observer) to emerge.

(c) Interface

According to the *Encyclopedia Britannica*, *interface* is described in physics as a "surface separating two phases of matter." As matter can only be applied to machines but not digital applications, the use of the term interface here reflects a concept in computer science where it encompasses the physical machine—computer, cell phone, tablet, etc.— as well as the software, applications and processes utilized by these machines to facilitate the interaction between humans and information. This understanding of the term also reflects how more and more the physicality of computers is being immediated (Bolter and Grusin 1999). In other words, as we embrace digital technologies, the computer-mediated interface has become more and more transparent to the user. "In this sense, a transparent interface would be one that erases itself, so that the user is no longer aware of confronting a medium, but instead stands in an immediate relationship to the contents of the medium" (Bolter and Grusin 1999, pp. 23–24).

> Pervasive computing, also called ubiquitous computing, is the growing trend of embedding computational capability (generally in the form of microprocessors) into everyday objects to make them effectively communicate and perform useful tasks in a way that minimizes the end user's need to interact with computers as computers. Pervasive computing devices are network-connected and constantly available (Rouse et al. 2016, n.p.).

In this case, the interface, with its immediated components, becomes one unit with the task of mediating humans and information. The curriculum of interface design expresses such relationship by including the term user before interface in an attempt to more strictly define their connection. Speaking to the understanding, emergent within the field of computer arts that a computer or any digital product does not function only as a medium. On the contrary, the digital machine "operates simultaneously as medium, tool and context, in addition to its organizational and interactive elements" (Lambert 2009, n.p.), Tidwell affirms that

> [E]ach time someone uses an application, or any digital product, he carries on a conversation with the machine. It may be literal, as with a command line or phone menu, or tacit, like the "conversation" an artist has with her paints and canvas—the give and take between the craftsperson and the thing being built. With social software, it may even be a conversation by proxy. Whatever the case, the user interface mediates that conversation, helping users achieve whatever ends they had in mind (Tidwell 2013, p. 1).

In attempting to interrogate and fully comprehend the elements in interactive hybrid environments, a cybersemiotic approach (Brier 2008) is used here, taking into consideration that a human, either the creator or participant in such an environment, carries the same weight in creating meaning as the other elements of such environments. In order for this to happen, information must be seen as a physical expressions of computer or human language, signs and symbols, which through feedback loops allow the communication (Guddemi 2000; Bopry 2007; Brier 2008; Vidales 2017) mediated by an interface to be established. Any sustained attempt to combine such hybrid elements reveals autopoietic systems structurally coupling and emerging within systems (Guddemi 2000; Bopry 2007; Brier 2008; Vidales 2017). The term meta-environment is here then introduced to express such strict relationship among user, information and interface with its infinite potential. As Jennifer Tidwell (2013) observes:

> As the user interface designer, then, you get to script that conversation, or at least define its terms. And if you're going to script a conversation, you should understand the human's side as well as possible. What are the user's motives and intentions? What "vocabulary" of words, icons, and gestures does the user expect to use? How can the application set expectations appropriately for the user? How do the user and the machine finally end up communicating meaning to each other? (p. 1).

The long-established segmentation of information has in fact restricted how we embrace interactive hybrid environments by either relating information to human perception or to interface processes. This study proposes meta-environment as a complex system that encompasses the triadic relationship, interactions and processes among user, information and interface and addresses the concerns posed by Søren Brier (2008):

> …whether the functionalistic and cybernetic research must be viewed as complementary to a phenomenological-hermeneutical-semiotic line of theorizing on signification and meaning that ignores ontological questions outside culture, or whether these might be united within one paradigmatic framework through a revision of the ontological and epistemological foundations of both classical and modern sciences, as Peirce attempts (p. 37).

Today, the term meta-environment is used in the field of computer science to describe "the interactive development environment for constructing language definitions and for generating and testing particular testing environments" (Klint 1991, p. 109). It refers to a series of processes and syntaxes that not only describe but also facilitate the exchange of information in complex information systems. I propose to expand the concept of meta-environment to include the relational processes of data/information, metadata, database, applications, user interaction, and information communication existent in the triadic relationship among user, information, and interface. In practice, this concept implies the overall communicability among the different elements involved in the processes of storing, relating, inputting, and outputting information as well as the user's actions and the many elements of the interface, such as software and hardware.

10.7 Learning to Embody Digital Technology

To ground a critical interrogation of narratives of embodiment and the different mediation capabilities of the meta-environment requires another brief examination of recent history. Marshall McLuhan (1964) provided one starting point from which to understand how and why space-time perceptions need re-examination when he observed that "During the mechanical ages we had extended our bodies in space. Today, after more than a century of electric technology, we have extended our central nervous system itself in a global embrace, abolishing both space and time as far as our planet is concerned" (McLuhan 1964, p. 3). It is fascinating consider that in 1964, twenty years before Apple's first graphical interface computer, McLuhan believed that the future of new communications media and digital technologies would involve abolishing perceptions of space and time grounded in the embodied experience of the mechanical age. This is understandable as in 1964 embodied space-centric perceptions were inscribed and reinscribed by media and communications developments in photography, film, TV, radio, telephone, and so forth. Perceptions of time as linear and interval-based and the perceived qualities of these communications media (electric technologies) were qualitatively different from the Euclidian space-centric and cyclical time perceptions, and it seemed logical that new understandings needed to emerge.

Interesting enough, even as we transition to the digital age, instead of negotiating new space-time understandings, we chose to *immediate*[18] the experience by representing digital media through embodied narratives and by pretending that the media exhibit qualities identical to those of the physical world and the consciously embodied humans experience. Our need for embodiment restricts our perception of digital information to being physically constrained, linear in scope, and synchronous. In *The Language of New Media*, Lev Manovich (2002) defines some tendencies in digital information: numerical representation, modularity, automation, variability, and transcoding, which suggests that digital information is potentially omnipotent (not subject to physical limitations), omniscient (capable of knowing all things at once), and omnipresent (manifesting anywhere and at any time). These descriptions obviously depict a bodiless entity. We can even diverge here a moment to acknowledge the god-like qualities being attributed to a putative digital entity, reimagined as an almighty being that can navigate on a plane reserved for the sacred.

Despite the profound implications of such attributions, information -with its vast possibilities— remains bound by the medium, whether human or machine, where sign-objects are seen as representing either brain or computer processes. It is difficult to disentangle information from embodiment, particularly for the human

[18] The practice of attempting to make the medium transparent to the user is not new. According to Jay David Bolter and Richard Grusin (2000), immediacy is a "transparent interface [that] would (be one that) erases itself, so that the user is no longer aware of confronting a medium, but instead stands in an immediate relationship to the contents of that medium …the desire for immediacy itself has a history that is not easily overcome. At least since the Renaissance, it has been a defining feature of Western visual (and for that matter verbal) representation" (p. 24).

observer who is intimately involved in bringing meaning to the exchange even as it is happening. This close proximity does not allow the observer to perceive form and details with maximum clarity (Merleau-Ponty 2015). But what if in our need to represent reality as we see it, we are too close to the subject matter to see the whole? Or just as in the use of linear perspective, introduced earlier to exemplify how in attempting to reproduce reality humans actually learned to see it in a distorted manner, our need for embodiment may be restricting the possibility of developing new paradigms of space and time representation.

On January 24, 1984, Apple Computer introduced Macintosh,[19] the first personal computer with graphical interface. This was an historic event because the advent of graphic interfaces freed the user from having to learn computer languages and codes and to think in terms of linear digital processes. In effect, this also released the user from being a conscious mediator in HCI. Even though this event can be considered a milestone in the development of digital computer interfaces, much of the research, hopes and expectations for digitally mediated technologies were already in full development at that time. Four years earlier, at the 7th ACM SIGGRAPH Conference proceedings, Richard Bolt described Nicholas Negroponte and the MIT Architecture Machine Group "Media Room"[20] as "a physical facility where the user's terminal is literally a room into which one steps, rather than a desk-top CRT before which one is perched" (Bolt 2003, p. 434).

The "Media Room" was an early attempt to address HCI issues and create an environment that was more intuitive and appealing for the user. Two decades later, Bolt's article was republished, this time with an introduction by Nick Montfort (Wardrip-Fruin and Montfort 2003). Montfort's introduction is revealing. It offers some clues on the reasons we have been interacting with computer interfaces as if they are physically embodied mediators of HCI experiences, and it unintentionally suggests a key point that we have been missing.

> Data is represented spatially on all graphic computers today, but it is almost always represented in two-dimensional space. The Media Room set up by Nicholas Negroponte at MIT's Architecture Machine Group, and described by Bolt's essay, was spatial in at least two ways. It used two-dimensional screens to provide a view into a simulated three dimensional-space. It also employed an arrangement of screens and speakers situated in the architectural space of the room. By creating an extravagant computing environment, *rather than doing more focused study of specific communications modalities considered separately*, researchers in the Architecture Machine Group were able to arrive at a surprisingly different, and extremely useful, concept of human-computer interaction, in which these two types of space are experienced by the user as one (Wardrip-Fruin and Montfort 2003, p. 233; emphasis added).

In an attempt to create a more user-friendly interactive experience, Negroponte and the Architecture Machine Group decided to ignore the specific individual qualities

[19] Source: The original TV advertisement for the first Apple Computer Macintosh (Apple 1984).

[20] Led by Nicholas Negroponte, MIT – Massachusetts Institute of Technology Architecture Machine Group was an avant-garde research center for the study of human-computer interactions and is the precursor of today's MIT Media Lab. https://www.theverge.com/2012/5/24/3040959/dataland-mits-70s-media-room-concept-that-influenced-the-mac

of the different elements (communications modalities) in the Media Room while representing the HCI experience as if it were physically embodied via a simulated three-dimensional architecture. It was a brilliant solution at the time, but it left a legacy of conceptual and terminological confusion to describe the new layer of embodiment in HCI, which didn't necessarily exist, thus limiting the medium exclusively to its physical qualities.

10.8 Semiotics of Embodiment

Apple's graphic interfaces and MIT's Media Room are examples of how we have learned to perceive the computer interface as an embodied mediator in HCI. Thirty-five years after Bolt's article, art and design practitioners working with digital interfaces as well as scholars addressing HCI and related fields such as cybernetics, information theory, semiotics, and new media still rely primarily on physical narratives emphasizing embodiment to describe and represent the architecture of digital information environments and HCI. Apple, Microsoft, Adobe, Autodesk, Google, to name a few, have invested extensively to develop graphic user interfaces (GUI) and in the process have adopted a sign system of icons and terminologies, all referring to physical objects and qualities to represent the digital world. Again, the creation of a system of representation that relies heavily or even exclusively on the physical world to define completely new actions, processes and perceptions introduced by digital technology has facilitated the development of human-computer interactions, yet as time has passed and new generations are born into the digital age, much of the commonly employed language begins to seem obsolete. Nevertheless, we keep introducing it the same way over and over again. Digital technologies appear to call on our bodies to position ourselves in the manner and relationship that best facilitates our perceiving and experiencing them (Merleau-Ponty 1978).

The history of personal computers and GUI and the attendant terminologies consistently reflect symbolic representations of the physical world. Terms such as desktop computer or laptop computer refer to a physicality that is specific to the human body in the physical world. Almost thirty years ago, when I started to teach graphic design applications such as Adobe (formerly Aldus) PageMaker,[21] it made sense to employ certain specific terms to describe the interfaces since they attempted to mimic a designer or draftsperson's working table with a tool box on the left, letterset types on the top of the table, the pasteboard area around the document, and color palettes to mix colors. These terms allowed a much easier transition from the physical world to the digital world, but today, when introducing graphic design to students, these same terms seem obsolete, as they do not represent anything for the new apprentices in the field.

[21] Initially developed by Aldus in 1985 (Fox 2015) and later (2004–2005) bought by Adobe Systems, PageMaker was a desktop publishing application introduced with Apple Macintosh computers. Today Adobe PageMaker is superseded by Adobe InDesign.

The evolution of the graphic interface has been accompanying the advent of digital environments. We can observe such evolution through the lens of Peirce's semiotic sign objects and an analysis of how our human need to embody the world through signs affects our embracing of the digital world from icons, to indexes, to symbols.

> One very important triad is this: it has been found that there are three kinds of signs which are all indispensable in all reasoning; the first is the diagrammatic sign or icon, which exhibits a similarity or analogy to the subject of discourse; the second is the index, which like a pronoun demonstrative or relative, forces the attention to the particular object intended without describing it; the third is the general name or description which signifies its object by means of an association of ideas or habitual connection between the name and the character signified (Peirce 1991, p. 181).

In the initial need for embodiment, these signs may have the same likeness as the physical world, imitating in form and purpose what they stand for. For example, the term *leading*, which refers to a metal bar made of lead used to separate the lines of text in hot type press printing,[22] can be said to initially be a sign-icon as the word refers to and resembles the metal used. In the sixties, even though hot presses were already in decline in favor of cold type presses,[23] the term *leading* was still used to reference the physical object. As the hot and cold type press processes gave way to digital processes, the term became a sign-index, a synonym of separating lines of text. Today most people only know the sign-symbol for leading as the space between lines. The context changed, and so did the observer, who now can't find the same meaning in these sign objects. A parallel conversation can be added about the semiotics of emoticons but that would detour from the aim of this discussion, which attempts to highlight the choices to describe and communicate the digital world and experiences.

In Amazon Echo voice service, Alexa, the system is embodied as a female server defining how it is potentially used. The female servant of the master's desires impinges on social-political-cultural issues that are deeply ingrained in our society and full of implication for feminist or cultural studies investigation, although this is not the purpose or approach of this discussion. In Alexa's case, the disembodied gadget, embodied as a female servant, at first glance may seem to be a clever marketing ploy, but in reality, such embodiment reinforces social and cultural representational norms difficult to ignore or detach from. Much of the terminology employed in the digital world correlates closely with the physical world, yet the original reasons for such terminology are slowly fading away with the rapid development of digital technologies. As these new technologies continue to permeate our everyday

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[22] Hot type press is a somewhat obsolete printing press process where the type setting composition is made of metal melted into type molds where the text is composed manually, character by character. In the late 1800, the Linotype machine, a line by line metal press, was introduced revolutionizing the newspaper industry (Roberts 1980).

[23] Cold type presses appeared in 1960s and are officially known as phototypesetting. There is a great movie from the era introducing the new system to the press labors. https://vimeo.com/127605644

lives, they strengthen the relationship and interaction among user, information, and interface and expand the mediation capabilities of the meta-environment. At the same time, its interaction with the physical world, objects or actions diminishes or ceases to exist, giving rise to new challenges and opportunities to reconceptualize how we represent the digital realm.

It is interesting to realize that the user's presumptive need for a language and aesthetics of physicality (Heidegger 2010; Merleau-Ponty 2015) dictates processes and perceptions that reinforce the space-time continuum representational paradigm which is limiting and linear in scope, restricting information's potential and preventing a more balanced integration among user, information, and interface. How we embodied space and time in the past and are experiencing them today are shaped by the technologies around us and expressed in the aesthetic creations that emerge from such experiences. When, in the sixteenth century, Giorgio Vasari documented Leonardo da Vinci's technological advances in aerial perspective, foreshortening, and use of light and darks to create volume and depth, he was contextualizing the employment of new technologies and highlighting the new aesthetic experiences that artists were promoting (Vasari 1998). Da Vinci's artworks maximized the potential of the technologies of his time and, along with some of his peers, helped change how humans perceive space and their sense of self in it. Since the Renaissance, naturalistic representations of space have been the norm, and, such representations advanced quickly with the advent of the mechanical age and the many news tools and innovations brought to bear in artistic creation, leading to changes in human consciousness regarding aesthetic perceptions of space and time and the self in relation to space and time.

10.9 Space and Time Aesthetics

The creation of aesthetic structures and experiences that emphasize space allow the artist to communicate our embodied perception of the world. The creation of aesthetic structures and experiences that emphasize time allow the artist to navigate the changes we actually perceive in the digital age. Over human history, we have learned to perceive space and time differently. Eastern and ancient indigenous cultures relied on the knowledge of nature to guide their aesthetic understanding of space and time. In Zen teachings, space may be empty but at the same time carry the potential for entropy and as such for life and death (empty again) (Shlain 2007). The Japanese principle of Notan, which is "the interaction between positive (light) and negative (dark) space," offers the potential of balance and harmony. The Chinese symbol Yin-Yang embodies the principle of Notan. The opposing forces "that have equal and inseparable reality" (Bothwell and Mayfield 1991, p. 6), suggesting that space is infinite and so is time. Variations of the Egyptian or Greek symbol *Ouroboros* (a serpent swallowing its own tail) can be found in different Eastern and indigenous civilizations to represent infinite time. In Aztec culture, the circle apparent in *Ouroboros* reinforces the whole and represents the infinite cycles of life; the return of the seasons, of the sun, of the flowers and fruits; time without beginning or end, sustained by the balance between the all and nothingness.

Initially, in the ancient Greek civilization, time and space were entangled with the gods, existing in non-linear time in a space without earthly boundaries, yet sharing the essence of the Ouroboros. "Aristotle straightened out the arabesque shape of time [by demythologizing] the Three Daughters of Necessity. These three Fates were Lachesis, who guarded what had been, Clotho, who guarded what is, and Atropos who oversaw what is yet to come" (Shlain 2007, p. 32). In doing so, Aristotle straightened the circle of time, giving the sequence of past, present, and future. Giving birth to geometry, "Euclid organized space by connecting it through an imaginary web of straight lines that in fact do not exist in nature" (Shlain 2007, p. 31). Euclid's geometric straight lines coupled with Aristotle's arrow of time shifted the original notion of atemporal and boundless space to the understanding of space represented on one plane and with time movement in one direction. The new geometric space and linear time aesthetics of the ancient Greeks were reflected in their sculptures, architecture, and proportional forms. Euclidean points in space instigated the all or nothing duality embraced by Christianity.

Early in the history of Christianity, Saint Augustine brought God into the perception of space and time. Space was no longer measured but instead split between heaven and hell. Time lost its linearity as it became God's divine and eternal events supported by Genesis and Judgment Day. Human events ceased to be relevant. Pagan artworks were destroyed along with books and knowledge of earthly events. Illiteracy called for simplified images to tell Jesus' story on earth and the story of heaven and hell. This new aesthetic of time and space gave rise to segmented pieces that only have meaning when experienced in their totality. Tapestries, mosaics, and triptych paintings reflected this segmentation of space, which became reflected in the socio-political hierarchies of the feudal system. The Dark Ages (A.D. 400 to A.D. 1250) utilized art to represent the divine, tell its story, and define its understanding of time. The science of the ancient world was replaced by a theological system of belief (Shlain 1991; Heelan 1988).

The vacuum created in Medieval times instigated a need to rediscover the knowledge of the ancient Greeks, giving way to "Renaissance artists [like] Giotto di Bondone (1276–1337), Alberti (1404–1472), and Leonardo da Vinci (1452–1519) rediscovering the science of pictorial perspective and predictive measurement of space that ultimately enable Copernicus (1473–1543) to correctly identify the center of the solar system" (Shlain in Mauldin 2011, n.p.). Space and time became again linear, converging in the horizon and on to death. The technologies introduced in the Renaissance changed human perception, the artist unique point of view became the divine, freezing time on a canvas, wall, and ceiling. Linear perspective, use of value scale to portrait volume, added a third dimension of space, depth.

> In the nineteenth century Manet (1932–1883) and Cezanne (1839–1906) begin to flatten pictorial space and deny the use of a single viewpoint and mathematical perspective (a stylistic standard for centuries). Their stylistic achievements lead Georges Braque (1882–1963) and Pablo Picasso (1881–1973) to develop cubism representing completely fractured space and time and perspective. Physicists exploring non-Euclidean space and

> Einstein's (1879–1955) development of his theory of relativity (and proof of physical impossibility of a single viewpoint of space) follow these great changes in traditional use of pictorial space. Not that any particular physicist studied the paintings of Giotto, Cezanne or Picasso, but that the painting styles of these artists provide a visual representation of developments in theoretical physics (Shlain in Mauldin 2011, n.p.)

The advent of the mechanical age gave rise to enhanced aesthetic perceptions of space and time intrinsically connected along a continuum and represented by linear perspective positioning the viewer as an observer outside the frame and experiencing one specific moment in time. Our sense of episodic memory expanded through the mnemonic aid of the space-time continuum and developing media and communications such as photography, film, TV, radio, and the telephone. When in 1964 McLuhan wrote of "a global embrace, abolishing both space and time" (McLuhan 1964, p. 3), human computer interactions were not yet mediated by graphic user interfaces. Thus, McLuhan's notion of abolishing both space and time reflected the raw qualities of the digital medium as nonembodied, atemporal bits. My own research suggests that abolition of space and time is closer to a futuristic fantasy. A more grounded, defensible, and productive formulation is found in Thomas Kuhn's (1970) notion of a paradigm shift. The developing technologies of the digital age are underpinning a transformative shift in human perceptions and aesthetic representations of space and time. The development of GUI (Graphic User Interface) was—somewhat paradoxically—accompanied by narratives of physicality and embodiment that McLuhan had not foreseen. Decades before McLuhan's bold prophecy, Henri Bergson approached the question this way:

> If you abolish my consciousness … matter resolves itself into numberless vibrations, all linked together in uninterrupted continuity, all bound up with each other, and traveling in every direction like shivers. In short, try first to connect together the discontinuous objects of daily experience; then, resolve the motionless continuity of these qualities into vibrations, which are moving in place; finally, attach yourself to these movements, by freeing yourself from the divisible space that underlies them in order to consider only their mobility – this undivided act that your consciousness grasps in the movement that you yourself execute. You will obtain a vision of matter that is perhaps fatiguing for your imagination, but pure and stripped of what the requirements of life make you add to it in external perception. Reestablish now my consciousness, and with it, the requirements of life: farther and farther, and by crossing over each time enormous periods of the internal history of things, quasi-instantaneous views are going to be taken, views this time pictorial, of which the most vivid colors condense an infinity of repetitions and elementary changes. In just the same way the thousands of successive positions of a runner are contracted into one sole symbolic attitude, which our eye perceives, which art reproduces, and which becomes for everyone the image of a man who runs (Bergson 1994, pp. 208–209).

Bergson and McLuhan mark different moments within the larger context of a shift in representational paradigms and also different methodological emphases. McLuhan emphasized the transformative role of communications media in themselves, whereas Bergson focused on the centrality of human consciousness, which is to say that he proceeded from a phenomenological-hermeneutic perspective.

10.10 Combining Perceptions and Processes

Examining technological change in an earlier era of human history, Wolfgang Schivelbusch (2014) describes how the advent of the railroad changed the way humans perceive time and space. "Annihilation of time and space was the *topos* which the early nineteenth century used to describe the new situation into which the railroad placed natural space after depriving it of its hitherto absolute powers. Motion was no longer dependent on the conditions of natural space, but on mechanical power that created its own new spatiality" (Schivelbusch 2014, p.10). Schivelbusch's theory is based on what was once the radically new experience of connecting two cities through a train ride. As people began to travel from one point to another at much higher speeds than by earlier means of transportation, the time they spent in travel diminished quantitatively. And as more areas were incorporated along the track line, people also had quantitatively expanded access to towns and cities previously inaccessible. The impact on human consciousness was that, through the expansion of access, "Space [was] killed by the railways," (Schivelbusch 2014, p. 37) leaving only time. Traveling had become little more than a subjective experience, reduced to the perception of the time spent between departure and arrival. This contradiction between expanding access to new spaces and diminishing the time spent between two points transformed perceptions of the time-space continuum.

Examining digital technological innovation, Paul Virilio (1995) suggests that we may be experiencing a new and very different annihilation: the destruction of human interaction. He argues that the advent of the cyber world is distracting our perceptions and alienating us from one another. Virilio believes that, because of digital technological tools, authentic perception is lost, leaving only a fundamental disorientation (Virilio 1995), a physical state of numbness, as human interaction ceases to occur, even with ourselves. Virilio's rationale is that easy access to electronic devices and technological tools from cell phones to virtual reality interfaces may be amplifying our interaction with the various media, but concurrently diminishing our interactions with ourselves and others. Means of electronic communication are getting faster and cheaper, allowing us to isolate ourselves from reality. Instead of being in the here and now, we are each in our own isolated world, with our phones, headphones, computers, and e-books, attempting to relate to something, but not necessarily to ourselves or anybody in particular. This phenomenon represents an expansion of technological interaction but an annihilation of human interaction.

Ascott has long argued that computers already mediate human interactions and that this is the stark reality we must confront. In an article entitled "The Architecture of Cyberperception" (Ascott 2007), he described how human perception was being transformed by the advent of information technologies and the internet, especially the influence of cybernetics feedback processes. Ordinary perception, "... the awareness of the elements of the environment through physical sensation, [was becoming] computer-mediated and computer enhanced" (Ascott 2007, p. 320). Ascott's concept of cyberperception may have seemed futuristic and utopian in 1994, but in

2019 it is commonly accepted that our perception of reality is indeed thoroughly integrated with the computer world, totally mediated by computer and information technologies. The question artists must confront is how best to effect a balance between mind and matter, how to call attention to the enormous positive potential in the use of technological tools to generate and enhance human interaction.

In the previous sections, the experience and practice of embodiment in the meta-environment were introduced, highlighting the dissimilarities among user, information, and interface and the knowledge that it is the user who actualizes the interactions in the meta-environment. As a system, the syncretic interactions among the elements in the meta-environment experience structural coupling, yet it is "the role of the individual interpreter [user] that grounds both semiotics and second-order cybernetics in the phenomenology of experience" (Bopry 2007, p. 35). Constrained in the humanities/art and science divide, which was exposed by C. P. Snow in *The Two Cultures and the Scientific Revolution* (1959), it is almost impossible to break this divide without re-thinking how we address human users, information, and interface. In his search for a generative and integrative framework, Paul Cobley asserts,. "Cybersemiotics is a truly transdisciplinary project. It is not so much that it criss-crosses the sciences and the humanities and invokes knowledge from both (although it does do that), but rather it is transdisciplinary because it explores, through expertise in philosophy of science, concepts which have a purchase right across nature and culture" (Cobley 2010, p. 2045).

In the implementation of web interfaces, information is translated to the user through a design environment that assumes embodiment. In this case, the user's need for physicality appears to dictate processes and perceptions that are limiting and linear in scope, restricting information's potential, and consequently the need arises for a more balanced integration among the elements in the meta-environment: user, information, and interface. Analyzing the meta-environment's triadic relationship through the lens of cybersemiotic reveals as a complex adaptive system, leading to a multitude of interacting elements that can possibly expand space-time perceptions and facilitate the conversion of information into knowledge. When we rethink how the elements of the meta-environment relate to each other and their representational properties of space and time, we start seeing the implications that these elements have on each other and on our human understanding of consciousness.

10.11 The Cybersemiotic Framework

Through HCI it is a challenge to determine how to address the different facets of interactive hybrid environments and simultaneously embrace their complexity and potential to promote qualia without an integrative framework. The terms human-computer interaction (HCI), user interface (UI), user experience (UX), and graphic user interface (GUI) are commonly used to describe and define interactive hybrid environments. Ontologically, these terms describe the elements and properties of humans interacting with physical interfaces that mediate digital information, yet they all have an exclusively dyadic human-machine focus wherein information is either conceived as human cognitive perception or as a logical process. Søren Brier elaborates on this divide:

> Science is still faced with the problem of meaning. The background of cybersemiotics is the recognition that Western philosophy of science is in a state of crisis. Western culture is at a turning point when it comes to taking the final step into a knowledge culture based on information and communication technology. Rather than basing our culture on the conception that the highest goal of knowledge is an abstract, non-embodied and globally available (artificial, impersonal) intelligence of information programs, I believe that we should ground our culture(s) on embodied human living (personal as well as interpersonal), i.e. on semiotic intelligence as part of both living nature and human culture, rather than only on the physical science and the worldview behind it.
>
> The current dominant objectivist science, which to me includes physicalism, eliminative materialism, cognitive sciences based on the information processing paradigm, cannot encompass self-aware consciousness and social-communicative meaning as causal agents in nature. Current cognitive science attempts to explain human communication from the outside without recognizing the phenomenological and hermeneutical aspects of existence. Its conception of human (meaningful) language and communication as a sort of culturally developed program for social information processing between computational brains/ minds cannot explain the evolution of embodied consciousness and (meaningful) human language and communication (Brier 2013, p. 222).

While researching potential frameworks to integrate perceptions and processes, I resonated with the statement that cybersemiotics provides: "a transdisciplinary theory of Information, Cognition, Meaning, Communication and Consciousness that integrates Cybernetics and Peircean Semiotic paradigms in a common framework" (Brier 2008, p. 20). Insights from cybersemiotics enabled me to highlight the cognitive dissonance between human perception and interactive hybrid environment to examine and accord equal weight to interactive hybrid environments, in general, and to the elements of the meta-environment in particular.

> All the ontological attempts to create objective concepts of information result in concepts that cannot encompass meaning and experience of embodied living and social systems. There is no conclusive evidence that the core of reality across nature, culture, life and mind is purely either mathematical, logical or of a computational nature. Therefore, the core of the information concept should not be based only on pure logical or mathematical rationality. We need to include interpretation, signification and meaning construction in our transdisciplinary framework for information as a basic aspect of reality alongside the physical, chemical and molecular biological (Brier 2015, p. 1).

Brier's explanation enables my understanding that humans are a complex adaptive system and anything that involves or is involved with humans becomes an integral part of this system. This statement can be translated into practice by taking into consideration that, when dealing with dynamic interactive hybrid environments, the manner in which we perceive the information or relate to the interface can be significantly affected by such subjective factors as a headache, excessive noise, a feeling such as anger, the type size of text (if one is reading), the amount of light in the environment, and so forth. Failure to comprehend that humans are essentially a dynamic complex and adaptive system has limited the full understanding of our existence and exchanges with the world.

10.12 An Integrative Framework

Earlier in this chapter the idea that the primary motivation of the artist and the art-object is to connect with the audience was introduced, thereby engendering interaction and communication among artist, artwork, and audience (Ascott 2007). This idea draws on Duchamp's notions of the role of interaction in art and also helps support an interpretive stance on the artwork emphasizing relativity and change (Shanken 2007). This stance refocuses representation from static to dynamic and acknowledges the manner in which form gives life to meaning through the artist's and spectator's individual perceptions and consciousness (qualia). Ascott's call to integrate the user-creator with the user-spectator in interactive artworks derived from the need he sees of applying second-order cybernetics to such art practices. Defined as "the study of the control and communication of complex systems, whether they are living organisms, machines or organizations, paying special attention to feedback as the main way of regulation" (Díaz Nafría 2009, n.p), first-order cybernetics allowed the integration of processes between humans and machines and consequently might have seemed the appropriate framework to study HCI. Initially concerned with observing the feedback processes that self-regulate and control the system, cybernetics evolved into second-order cybernetics in order to include the observer in the system. Elaborating on the differences between first and second order cybernetics, J. M. Díaz Nafría interprets Heinz von Foerster pointing out that first-order cybernetics questions "What and how are the mechanisms of feedback of the studied system?" whereas the second-order questions "How are we able to control, maintain and generate this system through feedback?" (Díaz Nafría 2009, n.p.).

When developing interactive hybrid environments, the concepts employed by the discipline of user interface design (UI) attempts to address Brier's concerns with first- and second-order cybernetics. A simple detail such as where a button to apply a change in the system is placed can be a continuation of the feedback processes or a break in the communication. Unfortunately, when a break happens, the user experience gets compromised since the process is broken and communication ceases. At this point, we need to take into consideration that the user exchange with the system and with information happens on an objective level (informational) as well as a subjective level (phenomenological) (Brier 2008, 2011). This exchange—and consequently the information that is created—has the potential to be more than the amount of disorder or randomness in a system (entropy) as seen in cybernetics. Information can be perceived as meaning when "organized into something recognizable and useable (words, symbols, gesture, etc.)" (Danesi 2011, p. 312).

> [Cybersemiotics] 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 (Brier 2013, p. 222).

The cybersemiotic framework allows the analysis of the elements of the meta-environment both individually and as a holistic system as it understands that information is not just "objective data, [since it needs] a context and a living system's interpretation to yield meaning" (Garcia 2013, p. 34). Nicholas Lambert reminds us that for computer arts, the computer has a broader function than simply being a medium. It "operates simultaneously as medium, tool and context, in addition to its organizational and interactive elements" (Lambert 2009, n.p.), opening the possibility that when examining interactive hybrid environments and the elements of the meta-environment, it may be discerned that the interface is not the only element mediating the interactions, that in fact human users and information mediate as well and meaning arises beyond data, beyond the exchange. This understanding reveals a complex adaptive system, which can only be fully comprehended through the integrative lens of cybersemiotics.

10.13 Mediated Properties

Cybersemiotics enables the understanding that the three elements in the meta-environment –user, information, interface– are part of a complex adaptive system and need to be equally balanced and analyzed, by factoring in the user's essential influence in the system and by considering the manner in which information functions as both human perception and logical process. Broadly speaking, cybersemiotics seeks to close the gap between art and science through combining the four approaches below:

1. A physico-chemical scientific paradigm based on third person objective empirical truth and mathematical theory but with no conceptions of experiential life, meaning and first person, embodied consciousness and therefore meaningful linguistic intersubjectivity.
2. A biological and natural historical science approach understood as the combination of genetic evolutionary theory with an ecological and thermodynamic view based on the evolution of experiential living systems as the ground fact, engaged in a search for empirical truth, but with no theory of meaning and first person embodied consciousness and thereby linguistic meaningful intersubjectivity.
3. A linguistic-cultural-social structuralist constructivism that sees all knowledge as constructions of meaning produced by the intersubjective web of language, cultural mentality and power, but with no concept of empirical truth, life, evolution, ecology and a very weak concept of subjective embodied first person consciousness, but taking conscious intersubjective communication and knowledge processes as the basic fact to study (the linguistic turn).
4. A phenomenological (Husserl) or actually phaneroscopic (Peirce) first person point of view taking conscious meaningful experiences before any distinction between subject and object as the ground fact, on which all meaningful knowledge is based, considering all result of the sciences including linguistics and

> embodiment of consciousness as secondary knowledge. This includes an intersubjective base in that Peirce considers all knowledge as intersubjectively produced through signs only emotions are Firstness (Brier 2011, n.p.).

Thus, from a design perspective, I propose we rethink the mediation capabilities of the elements in the meta-environment and their space-time and/or physical-digital characteristics based on Brier's cybersemiotic framework, which allows for the following analytical categories and correspondent mediation capabilities, as seen in Fig. 10.6. In this analysis, the meta-environment is seen as a closed system[24] with three distinctive interactive elements, and individually each element has many distinctive interactive parts. As such, it can be regarded as a dynamic complex system, where the influence of the individual elements on the system as a whole is greater than the sum of these elements (nonlinearity) and affects the system's predicted stability (chaos) (Gershenson and Heylighen 2005).

1. Physico-chemical focus:

Spatiality – Refers to how the element occupies the space, physical matter or digital bits.

Temporality – Distinction between temporal and atemporal qualities.

2. Biological and natural historical science focus:

Life/Living System – Essence: The element's core structure, matter (atoms) or bits.

3. Linguistic-cultural-social structuralist constructivism focus:

Sense/Meaning – Sign Processes: Relate to subjective or objective sign interpretation and meaning creation.

4. Qualia: Phenomenological – phaneroscopic first-person point of view focus:

Embodied Cognition – The process of meaning creation from "one mental space to another" (Brier 2008, p. 303).

5. Focus on the complexity of elements – user, information, interface – in relationship to the whole system.

Dynamic Complexity – Distinction between predictable/linear dynamics and chaotic/nonlinear dynamics.

> A common characteristic of models of complex systems is that they are nonlinear. This means that the elements of a system interact in ways that are more complex than additions and subtractions. In a linear system, we just add the properties of the elements, and we can deduce and predict the behavior of the system. Nevertheless, when there are many interactions, and these are nonlinear, small differences multiply overtime, yielding often chaos and unpredictability. In a nonlinear system, causes are not directly proportional to their effects. Big changes can have little or no effect, while small changes can have drastic consequences. This makes complex systems to be not completely predictable. (Gershenson and Heylighen 2005, n.p.)

[24] Meaning without exchange of matter.

Categories/ Elements	User	Information	Interface
Spatiality	Physical	Digital	Physical + Digital
Temporality	Temporal	Atemporal	Temporal + Atemporal
Essence	Atoms	Bits	Atoms + Bits
Sign Processes	Subjective	Objective + Subjective	Objective
Embodied Cognition	Embodied	Disembodied	Embodied + Disembodied
Dynamic Complexity	Linear + Nonlinear	Nonlinear	Linear

Fig. 10.7 Mediation capabilities of the elements in the meta-environment and their characteristics. Source: Jacques, 2016, p. 69

(Figure 10.7) shows the mediation capabilities of the elements of the meta-environment according to the categories presented above. It reveals that even though we have been relying on the interface as the sole mediator of spatiality, essence, embodied cognition, and temporality to promote human knowledge, information also mediates sign processes that convey cognitive meaning to embodied living beings (subjective) or binary codes (objective). In a similar manner, only the user can mediate dynamic experiential complexity, as it is the only element that presents predictable and linear dynamics as well as nonlinear dynamics.

10.14 The Cybersemiotic Experience[25]

In exploring the mediation capabilities of these elements in Fig. 10.6, I started to look at the meta-environment with the new understanding that to expand consciousness within interactive hybrid environments, it is necessary to ensure that user and information are also being seen as mediators in the system. It also became apparent that the context[26] surrounding the three core elements should also be accounted for as a fourth element influencing the meta-environment. The context can be described as external circumstances influencing user, information, and interface that are not regulated by them. Examples of context in interactive hybrid environments include lighting, temperature, background noise, and type of space. Integrating the four elements in the meta-environment —user, information, interface, and context— allows for the expansion of consciousness as the Cybersemiotic Experience (Jacques 2016)

[25] An earlier version of this text can be found in Jacques, 2016.

[26] The Oxford Dictionaries online define context as: "The circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood and assessed" (Context 2016).

of the Meta-Environment. This occurs simultaneously from outside, as active observation with some control over the intended object of observation (linear dynamics), and from inside, as the user participating in and constituting part of a whole. In the latter case, the user has little control over how interpretation, signification, and meaning are constructed or how his or hers physical, chemical, and biological nature influence and are influenced by the interaction process (non-linear dynamics).

As a visual artist, I think the best way to explain and illustrate how this paradigm shift might change the way we perceive and relate to the meta-environment is by exploring a three-dimensional representation of the cybersemiotic star with the understanding that the arms of the star represent the four aspects (natural, biological, phenomenological, semiotic) that ground the cybersemiotic framework united in the center by the integration of human knowledge and consciousness. The Cybersemiotic Experience can be represented by a three-dimensional tetrahedron (see Fig. 10.8) where each side of the figure represents one facet of the cybersemiotic star. This tetrahedron is an adaptive and dynamic self-regulating structure (see Fig. 10.9) that constantly experiences entropic changes in each of its four facets and is in constant change, becoming more or less pointy, expanding or reducing its sides in order to maintain its original structure (see Fig. 10.10).

Artistic and HCI practices not only rely on but also call for the Cybersemiotic Experience. When in 1967, Nelson Goodman founded Project Zero at Harvard's

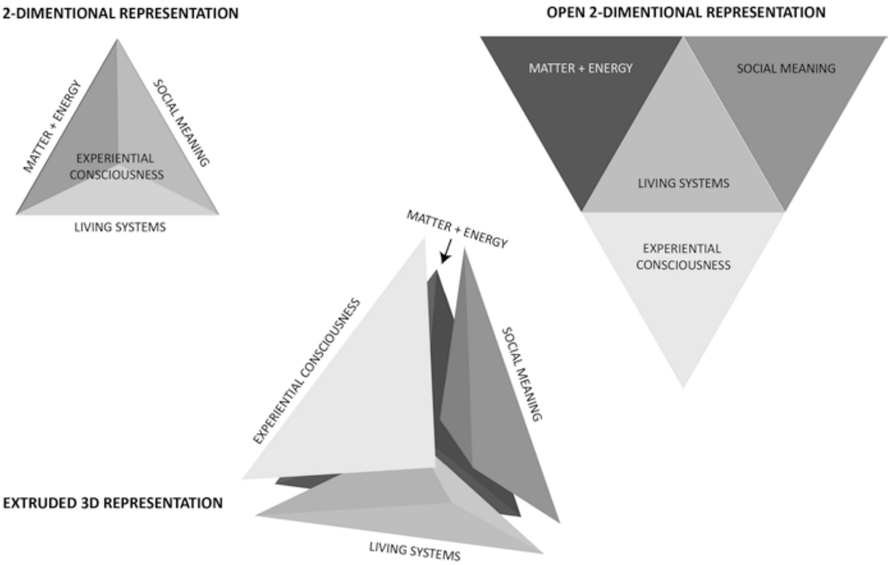

Fig. 10.8 Proposed tetrahedron representation of the adaptive facets of the cybersemiotic star (Jacques 2016)

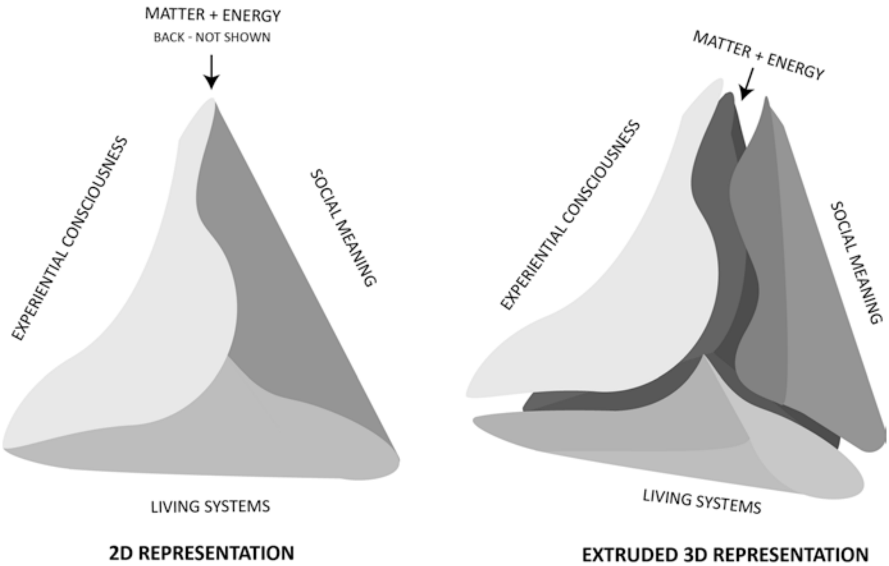

Fig. 10.9 Proposed tetrahedron representation for the Cybersemiotic Experience (Jacques 2016)

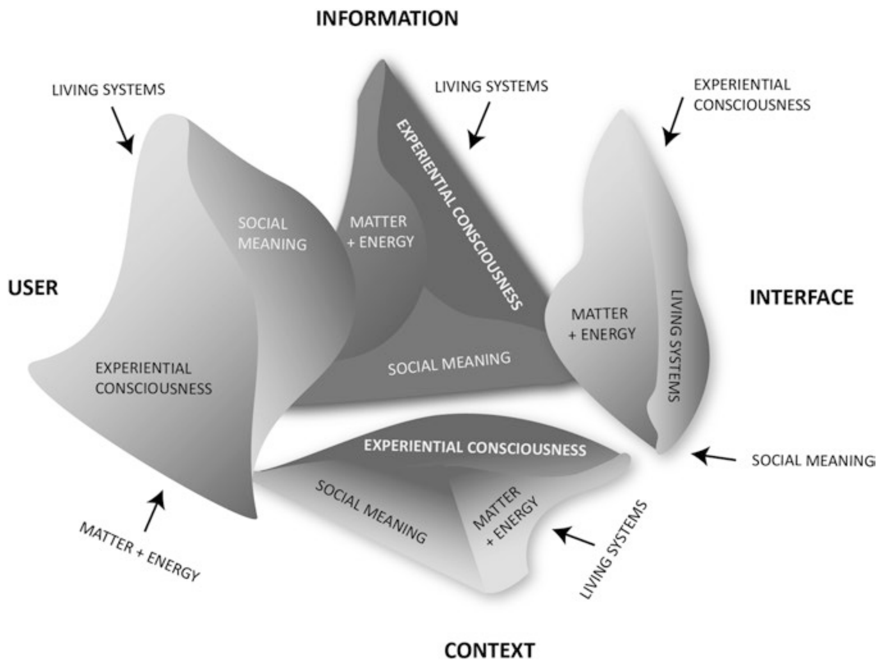

Fig. 10.10 Representation of the cybersemiotic experience in the meta-environment: elements' facets interacting exchanges (Jacques 2016)

Graduate School of Education "to study and improve education in the arts,"[27] his aim was to expose viewers [users] to the artistic process, aiming to "increase their sensitivity and discrimination, to encourage inquisitive looking and listening, to induce the experience of perceiving works and a world anew" (Goodman 1984, p. 160). The Cybersemiotic Experience expands Goodman's aims beyond the artistic realm and into the information processing paradigm by attempting to reconcile:

1. human meaningful information [with] meaningfully algorithmic processing of information;
2. how humans embody information to make meaning, and how embodied and un-embodied information differ;
3. consciousness with perception and embodied human knowledge;
4. culture and embodied knowledge … to integrate our knowledge of the role of first person experience, qualia, meaning and signification in our scientific knowledge of the evolution of life [humans] (Brier 2011, p. 4).

10.15 Conclusion

The theoretical and visual understanding of how the meta-environment functions in practice, is based on the cybersemiotic star's self-regulating capabilities an aim to balance in the system. Based on the understanding that interface mediation and representational paradigms that emphasize embodiment are limiting factors when representing the architecture of digital information environments and the user-information-interface relationship and that most current frameworks for analyzing these elements utilize a reductionist approach makes clear the need for reconceptualization. Ubiquitous computing is expanding human-computer interaction to everyday life; turning refrigerators, cars, phones, doors, and so forth, into interfaces; which, in turn, is changing and affecting how humans perceive and interact with information. This expansion of HCI, coupled with Graeme Sullivan's assertion that artists theorize by using "intuition and intellect, grounded in context-specific circumstances [to] provide an experimental base for constructing new frameworks of understanding" (Sullivan 2005, p. 73), reinforces the need for creative new understandings of the relationship among user, information, and interface. Through the lens of cybersemiotics, it is possible to rethink how the elements of the meta-environment relate to each other, to explain their mediation properties, and to start seeing the implications that these elements have for one another and for the possibilities of expanding consciousness.

Grounded on the cybersemiotic star, the representations of the evolving and complex interactions among the elements of the meta-environment gave birth to the Cybersemiotic Experience. User, information, and interface can then be seen taking

[27] "Project Zero" is still vibrant today. More about the Project can be found at http://www.pz.harvard.edu/who-we-are/about

turns in mediating the interaction and promoting meaning through an inner-outer world exchange. Ascott describes this exchange as the “double gaze, seeing at once both inward realities and the outward surfaces of the world” (Ascott 2007, p. 358) and consequently promoting two distinctively different fields of experience (double consciousness). Brier presents the outer world as *Umwelt*, based on von Uexküll’s “objective life world of the animal mediated by interpretations in the context of what makes sense from a biological, evolutionary sense” (Garcia 2013, p. 167) which, according to Thomas Sebeok, the father of biosemiotics (Brier 2008, 2013; Cobley 2010; Cobley and Jansz 2012; Garcia 2013), brings forth an *Innenwelt* (inner world). In the creation of meaning, the possibility of new mediations and perceptions reflects the semiotic dance and the infinite possibility of interactions in meaning production. As interactive hybrid environments are shared physically and/or digitally (networked), the potential is for a meta-environment to interact with other meta-environments, expanding the complexity in elements and interactions in the Cybersemiotic Experience and promoting the potential for shared consciousness.

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Chapter 11
The Communication of Form. Why Cybersemiotic Star Is Necessary for Information Studies?

Liqian Zhou

> *The problem of meaning in its most general form is the problem of how… we can get from the physics to the semantics.*
> *John Searle (1988, p. 27)*
> *I do not see why the inner world of cognition, emotions, and volition – including our cultural world of signs and meaning – should not be accepted as just as real as the physical world.*
>
> *Søren Brier (2008, p. 404)*

Abstract The chapter first formulates the problems of information and analyzes why they are hard to solve. Then it critically reviews two classes of prevailing theories in information studies arguing that they cannot attain success because the assumptions behind them are too limited. In recent years, some semioticians have rediscovered the theory of information developed by Peirce. Deeply embodied in semiotics, the theory treats information as the communication of form in semiosis, which should be interpreted in terms of triadic relation in the semiotic relational process between representamen, object and interpretant. As a contemporary development of Peircean theory, cybersemiotics further constructs a conceptual framework through integrating it with Luhmann's social system theory. In particular, the

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transdisciplinary framework cybersemiotics shows a promising way to explain superficially incompatible aspects of information with the aid of the principle of complementarity.

Keywords Information · Cybersemiotics · Peirce · Transdisciplinarity and complementarity

11.1 Introduction

Many scholars who encounter the concept of information in their fields have been aware of the fact that the dominant information-processing paradigm is not enough for studying information. There has been a desire ever since the birth of Shannon-paradigm of objective information science in 1948 that to find a theory of information, which would be able to encompass all the aspect usually being present in human communication such as covering data, meaning, and usefulness of information. However, the state of contemporary information studies seems like Hobbes' state of nature, in which each scholar would have a right to everything about information, but everybody fights against each other for their way of making theoretical sense of the information paradigm. So, we have a Hobbes' war of all against all. While different from the social world, the social contract for information studies is still out of reach for now.

In this chapter, I first analyze why the problem of information is so hard to solve. Then I critically review two classes of prevailing theories in information studies arguing that they can't success because of the assumptions behind them. I therefore turn to Peirce's theory of information dug out of his oeuvre by semioticians in recent years (De Tienne 2005; Queiroz and El-Hani 2007; Nöth 2012; Liszka 2016). I believe that it brings new light to information studies because the theory treats information as the communication of form and meaning through a process of interpretation in a transdisciplinary framework including hermeneutical and phenomenological aspect. Cybersemiotics further enlarges the transdisciplinary framework by drawing on general system theory, second order cybernetics and autopoiesis theory as they are integrated in Niklas Luhmann's social system theory.

11.2 The Problems of Information

The question of "*what is information?*" is a difficult one. As Floridi says, "Information is notoriously a polymorphic phenomenon and a polysemantic concept so, as an *explicandum*, it can be associated with several explanations, depending on the level of abstraction adopted and the cluster of requirements and *desiderata* orientating a theory" (Floridi 2017). After almost 70 years, the claim made by

Shannon that, "It is hardly to be expected that a single concept of information would satisfactorily account for the numerous possible applications of this general field" (Shannon 1993, p. 180), is still true. No need to say developing a unified theory of information (UTI). However, no one would disagree with Wiener's well-known slogan that "Information is information, not matter or energy" (Wiener 1961, p. 132). The claim is raised at the end of chapter V, *Computing Machine and Nervous system*, of his masterpiece. He recognizes that any physical mechanism that processing information must cost certain energy, no matter if it is a computer or a brain. In both Shannon's and Wiener's way, information is defined as the possibility of a signal being sent out of a set of possible signals. No matter the signal being sent or the one being received, both are physical events. It means that the possibility of a signal being sent is measured by the possibility of physical events implementing the signal. Similarly, the record, analysis, replication, transmission of information are embodied in computer and related devices and implemented by the physical states of the devices. All the physical events implementing information processing cost energy.

The analysis clears two facts: first, without physical events, information cannot manifest; second, the fact that physical consequences of information cannot be measured by the energy cost implies that information cannot identify the physical events implementing it. This is what Wiener argued in the slogan. It is counter-intuitive in two aspects: Ontologically, information is not something physical but has physical consequences; epistemologically, information cannot be explained by physical processes. Here we then come to the problem of information in general: what is information? As it is not physical, what is the place of information in material reality? It seems information studies is in a similar situation to consciousness studies. However, if we follow the way discussing consciousness, information study would have fallen in endless metaphysical debates as the area of philosophy of mind. Therefore, I believe the problem of information, in general, is an empty problem without being further analyzed into subproblems that are susceptible to explore. It is fortunate that the state of information study is much better of than the consciousness study. First, compared with consciousness, people have more sympathy in the claim that information having its place in nature. The problem is how to understand it. Second, we already have several good formulations and mathematic theories of information, which can be our departure towards a complete theory of information if there is one to be found.

Maybe the most well-known taxonomy of information in full sense comes from Weaver's comments on Shannon's mathematical theory of communication, in which information is divided into the technical, semantic and effectiveness level (Weaver 1949). What the problem of information that he focused on is, is the accuracy of information at these levels in transmission. However, the problem of information is not merely the accuracy problem. Put it in another way, in order to solve the accuracy problem in full sense, we have to explain more. Thus, what a unified theory of information (UTI) aims to do is to go beyond the limitation of this classical framework. Nowadays, there are several taxonomies of information in general,

- Syntactics, the formal aspect of information; semantics, the meaning aspect of information; and pragmatics, and pragmatics, the functional aspect of information. (Nauta 1972, pp. 39–41),
- "… information as reality (e.g. as patterns of physical signals, which are neither true nor false), also known as environmental information; information about reality (semantic information, alethically qualifiable); and information for reality (instructions, like genetic information, algorithms, orders, or recipes)" (Floridi 2010, p. 30),
- "a) Physical information: Information as intrinsically measurable medium properties with respect to their capacity to support b) or c) irrespective of any specific instantiation of b) or c). b) Referential information: information as a non-intrinsic relation to something other than medium properties a) that a given medium can provide (i.e. reference or content) irrespective of any specific instantiation of c). c) Normative information: Information as the use value provided by a given referential relation (b) with respect to an end-directed dynamic that is susceptible to contextual factors that are not directly accessible (i.e. functional value or significance)" (Deacon 2016, personal communication),
- (a) Counting information: the mathematical concept of information defined by Shannon; (b) information about something: the information system refers to physical background conditions distinct from, and absent from, the informational system itself; (c) shaping information: it is the form or pattern of existing things (Gregersen 2010, pp. 330–332),
- or in common sense, quantity, content, and usefulness, of information.

Although the terms different authors employ are different and the relations between them are diverse with respect to different considerations, their meanings are similar. Hence, it is clear that there is little doubt that information has three aspects. It provides the ground on which we can stand to formulate the material problem of information. Following, I will adopt Deacon's glossary, aka physical, referential, and normative information, to discuss the problems of information with respect to his most recent works on information (Deacon 2007, 2008, 2010, 2012, 2015). As we have argued above, information processing is instantiated by the changes of physical states in which information embodies. Put it simply, information is conveyed by signals. More specifically, patterns, forms, or differences, which we think conveying information content, are constituted by the physical properties of the information medium. I call this aspect of information physical information. Of course, we have good mathematical theories for measuring the quantity of physical information. In terms of Chalmers (Charmers 1995), this is the easy problem of information. We can always find a way to measure the complexity of those patterns, differences, forms, etc., that embodying information. As we will see later, some scholar thinks that information is everywhere in the universe as every difference is potential physical information (Stonier 1997, for instance). However, we cannot distinguish information from other phenomenon in nature with respect to its physical embodiment. The hard problem of physical information is that these physical patterns, forms, or differences can convey something non-physical, namely semantic content. How can it be possible? Why a painting of Winston Churchill occasionally drawn by traces of an ant is not a picture of him while a painting having wholly same pattern drawn by a painter is? (Putnam 1981, p. 1–2). The hard problem connects with the next aspect of information: referential information.

As Collier says, "The great tragedy of formal information theory is that its very expressive power is gained through abstraction away from the very thing that it has been designed to describe" (Collier 2003, p. 102). In other words, the formal theory misses the very thing that defines information. This very thing is referential information. Without saying anything about referential information, we can even say that those formal theories of information actually are not theories about information. Distinguishing from other phenomenon in nature, information, mind and language/sign have the ability to be about, to represent, or to stand for something else. It is a core theme in the philosophy of mind and language. Of course, we have the metaphysical problem of referential information that what it is. Then, we would come back to the problem of information, in general, we discuss at the beginning and fall in metaphysical debates again. However, I want to formulate the problem of referential information in a constructive way.

For information studies, what is counterintuitive is, that different from physical properties which are intrinsic to signals (physical information), information content is something extrinsic to its physical carriers. Then, the problem is that, how can physical information refer to something extrinsic to it? What is more mysterious, information content is not physical. How can physical information be about something not physical? Put it in another way, how can information content implement by physical signals? These are ontological problems of referential information. A piece of information always conveys the content about something other than itself. A bit of physical information, or a signal, always has a particular meaning, but that is the aspect that formal information theories do not deal with. As philosophy of language raises (for instance, Lycan 2008, p. 1), how a signal becomes meaningful? How a signal acquires its distinctive meaning? What is more, a signal conveys certain information content stably and reliably. The relation between a signal and its content/meaning is stable and reliable enough for signal employers in a community to identify the content from the signal. How does such relationship between emerges? These are problems of the genesis of referential information.

There is also the causal problem of referential information. Although referential information is not physical, it has physical consequences. Imagine the case that an American president who gives the order to launch nuclear missiles.

> The problem that lingers behind definitions of information boils down to a simple question: How can the content (aka meaning, reference, significant aboutness) of a sign or thought have any causal efficacy in the world if it is by definition not intrinsic to whatever physical object or process represents it? In other words, there is a paradox implicit in representational relationships. The content of a sign or signal is not an intrinsic property of whatever physically constitutes it. Rather, exactly the opposite is the case. The property of something that warrants calling something information, in the usual sense, is that it is something that the sign or signal conveying it is not (Deacon 2010, pp. 151).

Where does the causal power of referential information come from if we follow the principle of physical causal closure? As we can see, information studies share many common problems with the philosophy of language and of mind, it is easy to confuse information with language or signs in general. However, information is more subtle because it is intrinsically normative or end-directed. It is always for some end. It is not just meaningful but also individually significant. I call the useful aspect of information normative information. In Shannon's formal theory, information is defined with respect to the selection while the selection is always determined with respect to certain normative criterions (Weaver 1949). Information can be correct or incorrect, accurate or inaccurate, useful or useless for a specific receiver. What is unusual for information from language is that it has different significance for different individuals. The same signal may provide information about different things for different interpreters. Even for different interpreters, the same message may have different significance for each one. In other words, although physical and referential information is same, normative information may be different for different interpreters. Because the boundary conditions under which each interpreter employs the information are different. Then, the problem of normative information is that, why certain signal with physical and referential information has significance for its interpreters? Why are the significance of some information content different for different interpreters who are under different boundary conditions?

We do not lack good theories for each aspect of information.[1] For the measurement of the quantity of physical information, we have several good formal theories being sufficient for engineering purpose (Shannon 1948; Wiener 1961; Kolmogorov 1965, to name a few). For referential information, we have many theories of reference and meaning in the philosophy of language, such as Tarski-Davidson tradition, Austin-Searl tradition, Grice-Schiffer-Lewis tradition and Drestke-Millikan-Papineau tradition (Millikan 1984, p. 2). For normative information, it seems to correspond to pragmatics in linguistics. However, it is clear that these theories for different aspects of information distribute to different disciplines that range from engineering (communication engineering, for example) to natural science (for example, qua-bit and bioinformatics), to social science (library and information science, media and communication, for instance), and to humanities (philosophy, semiotics, linguistics, to name a few). Although there are some overlaps between these disciplines on information, the theories from the different areas are incoherent and full of conflicts. It is too bald to say that there exists a definition of information that is proper to all these theories and disciplines.

Nevertheless, there are still many endeavors trying to go beyond the limitation and to search for a UTI that can explain physical, referential and normative information coherently. Because many disciplines involving information are in need of a more developed transdisciplinary conception of information. Thus, the potential benefits of UTI are alluring. Although the road ahead is rough, many works aiming

[1] There are several other ways to formulate problems of information with respect to other considerations, for example, Floridi (2004a) proposes a much more broad way. The formulation here focuses on "what is information?"

to explain information in full sense have been done. Next, I examine these works and argue why they are not enough or doomed to fail.

11.3 Methodologically Reductionist and Fundamentalist Theories

In general, there are three classes of theories in contemporary information studies trying to develop full theories of information examples: methodologically reductionist, fundamentalist and transdisciplinary theories. In this section, I review first two classes of the theories and argue that the assumptions behind them are not convincing. Although Shannon has explicitly noted at the very beginning of his paper that his theory aims to solve engineering problem and has nothing to do with semantic information, it was unavoidable that there was a tendency to confuse it with semantic information. A notable argument against the tendency is that it confuses what is conveyed and what provides conveyance, or, meaning and the signal conveying the meaning (Bar-Hillel 1955).

With the distinction in mind, Carnap and Bar-Hillel (1952) develop a formal theory of semantic information. The theory assumes an ideal language system including all semantic statements. The amount of the statements are finite. Semantic statements are not the symbols representing them. Despite of the distinction, the formula measuring the amount of a semantic statement is structurally homogenous to Shannon's theory. The quantity of a semantic statement is measured by the probability of the occurrence of the statement in the language system. Less likely a statement happens in the system, more information it contains. However, the theory implies a paradox called Bar-Hillel-Carnap paradox by Floridi (2004b). According to the theory, we cannot decide the quantity of the information contained in a contradiction as it is infinite or none. Therefore, Floridi developed a theory of strongly semantic information based on alethic and discrepancy value rather than probabilities (Floridi 2004b, 2011).

No one would disagree that those theories are elegant in their form and ingenuity. However, scholars who want to find a theory explaining what information is dissatisfy with those formal theories. Some scholar, Dretske (1981), for instance, argues that semantic information is unmeasurable. Given the receiver already knows about the possibility of source, only when the conditional possibility of *s* being *F* is *1*, can we say that a signal carries the information *s* is *F*. Some may argue against that the requirement is too strong to accept (Collier 2015). Dretske argues that if the conditional possibility is not 1, then the sent and the received message are two different message qualitatively even with a little bit of difference. We can of course always find a way to measure semantic information, but it is with respect to certain standards affording a particular purpose. In other words, whether semantic information is measurable depends on the purpose they aim to afford. That is to say, the formal theories take semantic information for granted, and then proceeds to bracket it from consideration to deal with measurable features of information (Deacon 2010, p. 150).

Some researcher may argue that the ideal formal language system many logical and probability based theories presume do not exist. Chomsky has shown that all natural languages have the intrinsic capacity to generate an infinite number of well-formed sentences. (Brier 2015b), Thus, there is no such language can serve as the basis for those formal theories of semantic information. In addition, the language-centric framing in those theories is misleading that obscuring information's naturalistic and nondigital features. For example, "Does a sneeze have a meaning? Not in any standard sense, but it provides information "about" the state of a person who sneezed" (Deacon, 2016, personal communication).

Actually, the assumption behind those formal theories of semantic information is methodologically reductionism. All the theorists are aware of the fact that semantic information is different from the one handled by the mathematical theories. However, semantic content or meaning is not physical and thus has neither spatial nor temporal extension. While only things having extension are measurable. This is the reason why Descartes proposed mind-body dualism (Husserl 1936/1970) Therefore, in order to measure semantic information, it has to be transformed to something measurable methodologically, namely something has extension. As Descartes has already argued, only physical things have extension. Although semantic information cannot be reduced to physical properties, we can construct something having extension like physical ones but not physical with respect to particular criterions, aka some logical system. With the transformation, semantic content is reduced to something having extension methodologically. Then, the theories of semantic information cannot be generalized unconditionally unless come to embrace objective idealism like Hegel's. To put it differently, they are no help for those who want to explain information in full sense.

Opposite to the methodologically reductionist theories of information, the fundamentalist theories "treats it (information) as an unanalyzed primitive, and brackets its necessary physicality and efficacy from consideration in order to focus on intrinsic attributes" (Deacon 2010, p. 150). Generally, there are four kinds of theories. The mystical theory, Chalmers for instance, treats information as a basic property of the universe essentially different from other physical properties (Chalmers 1996). Information is not an *explanandum* but an *explanans*. This way is too counterintuitive for me. Some may argue that it does not solve but avoid the problem. The pan-informationalist or digitalist theories (Zuse 1967, 1969; Wheeler 1989; Schmidhuber 1997; Wolframe 2002; Dodig-Crnkovic 2011, to name a few) argue that the universe is fundamentally computable. As Floridi (2011) argues, the problem of the theories is that they lack specific boundary conditions under which they are workable and are thus empty. Another problem is that what we want is a theory being able to solve the problem "what is information?" While the answer those theories give is that "information is computable." Stonier (1997) identified information as organization being a basic property of the Cosmos. Then the term "information" is redundant as it is a synonymy of terms like organization, difference, structure, etc. Wu (2005) names a new subfield of the field of being the field of information and based on that new ontology develops a philosophy of information in Chinese style. However, what we want to explain is information in the common sense practical and meaningful universe rather than to name something metaphysical as information (Zhou and Brier 2015).

There is a common and stubborn assumption hiding behind the superficial conflicts between methodologically reductionist and fundamentalist classes of theories. Both classes implicitly treat information as something substantial like physical entities, or singularly present (Deacon 2010). Like water flow and air flow in which molecular as substantial entities flow from one place to another, it seems we talk about the flow of information in a similar sense. Of course, some may argue that information is not something physically substantial but difference, pattern, form, or data, etc. However, as we see above, the assumption is misleading. Many have been aware that we should not see information as something substantial and singular.

Actually, we should formulate information under the consideration of the whole situation of information transmission, as Weaver has shown long ago (Weaver 1949). Since the whole situation of information, namely communication, comes across almost all levels of the world, from physical, to biological, to cognitive, to social, as well as the disciplines of natural science can be arranged as a hierarchy, many scholars think that we should understand information in a transdisciplinary approach (Collier 1990, 1999; Deacon 2007, 2008; Hofkirchner 2013, to name a few). One of the most promising ways in the approach is a conceptual framework developed by a Danish scholar Søren Brier. Through combining Peircean semiotics and Luhmann's social system theory, Brier calls his transdisciplinary framework cybersemiotics. In the rest of the chapter, I first try to show how the theory of information developed by Peirce based on semiotics brings new light to the problems of information. Then, I will argue that the shape of a theory of information, covering the explanations of physical, referential, and normative information, is visible with the new development contributed by cybersemiotics. At last, I will explain why cybersemiotics makes a difference.

11.4 Information in Formation: Peirce's Theory of Information

In recent years, some semioticians rediscovered an exciting fact that Peirce developed a theory of information based on his theory of sign or rather his semiotics. Peirce not only developed a theory of the measurement of information (see Nöth 2012) but also a theory explaining how signs convey information embodying their semiotic process (De Tienne 2005; Queiroz and El-Hani 2007; Liszka 2016). In this section, I focus on the latter part of the theory as the former roots in the latter (De Tienne 2005). I argue that the theory brings new light to the telic nature of information. While, as many (Weaver 1949; Deacon 2007; Hofkirchner 2013, for instance) has recognized, the telic nature is the source of the hard problem. In his theory, Peirce shows that how meaning emerges in semiosis.

According to Peirce, semiosis can be defined as a triadic relation between a sign, its object and its interpretant. That is, sign, object and interpretant are the most basic constitutive elements of a semiosis. No one is reducible to another. Any description of semiosis involves a relation constituted by those three elementary terms. But the statuses of those three are not equal. In a semiosis, a sign is determined by its object and determines its interpretant. Put it differently, an object has an effect on one's mind, creating an interpretant, through a sign in semiosis. Obviously, the effect upon a mind is not a causal one. What is conveyed from the object to the mind by the sign in semiosis? Peirce says,

> … a Sign may be defined as a Medium for the communication of a Form. [...]. As a medium, the Sign is essentially in a triadic relation, to its Object which determines it, and to its Interpretant which it determines. [...] That which is communicated from the Object through the Sign to the Interpretant is a Form; that is to say, it is nothing like an existent, but is a power, is the fact that something would happen under certain conditions (Peirce 1992, 1998, p. 22).

It is the form in an object being conveyed to create an interpretant in one's mind by a sign in semiosis. Integrating both definitions of sign, we can define semiosis as a triadic process of communication of a form from the Object to the Interpretant through Sign mediation (Queiroz and El-Hani 2007, p. 291). The account of sign as a medium of the communication of a form explains the order of determination in semiosis, too. Peirce clarifies,

> As a medium, the Sign is essentially in a triadic relation, to its Object which it is determined, and to its interpretant which it determines. In its relation to the Object, the Sign is passive; that is to say, its correspondence to the Object is brought about by an effect upon the Sign, the Object remaining unaffected. On the other hand, in its relation to the Interpretant the sign is active, determining the Interpretant without being itself thereby affected (Peirce 1967, p. 2).

As Liszka argues, the communication of form in semiosis have three phases: First, the object determines the sigh by its form. Second, the sign determines the interpretant in a similar way in which the sign is determined by the object's form. Third, the interpretant effects something in the sign agent in a way similar to how the sign relates to the object. (Liszka 2016). Queiroz and El-hani (2007) argues that the communication of a form is information. Some may still not immediately be satisfied with the theory. First, it does not provide an account of form. If the term form is in the sense of difference, pattern, or data, it just provides an account of physical information. The formulation of the communication of form from an object to an interpretant through the mediation also reminds us the formulation of "the flow of information" in which information is seen as something substantial and singular. It falls in methodological reductionism. While this is a trap we want to avoid. Or if it is in the sense of Stonier's concept of organization as a basic property of the universe, then it leads to fundamentalism. In short, without an explanation of form, Peirce's theory cannot be successful. Second, as I have argued, the theory seems does not solve the problem that how the telic nature of information emerges in semiosis. Without the solution, we cannot distinguish the communication of form from data processing. It falls in methodological reductionism.

Actually, Peirce has solved both problems in his theory. Peirce begins his investigation of form with a Medieval debate: Do universals exist, or only individuals do and the universals are only nominal names for categories of individuals? (Liszka 2016, p. 53). Those who suggest universals exist are realists and those not are nominalists. Peirce stands with realists. He frames the question as that how a universal can present in an individual and answers it according to his semiotics. First, form is not a singular thing for Peirce. Although it is substantially embodied in the matter of an object, it can be conveyed to an interpretant by a sign which is outside the object (Peirce 1967, p. 3). It is something expressed as a regularity of its organization, or a habit. It is "…a representation of that state of things as represents only the sameness and diversities involved in that state of things, without definitely qualifying the subjects of the samenesses and diversities" (Peirce 1992, 1998, p. 378). In his most recent book, Deacon negatively frames the concept of form, regularity, or habit as the concept constraint. (Deacon 2012: chapter 6). He argues that a representation of sameness and diversities is realized through reducing those states, which would have possible implement, by a constraint. Through such formulation, the concept of form can get off from the trap of treating it as mental products. In short, a form is neither something substantial and singular nor some basic property of the universe.

The telic nature of information, or semiosis, originates from the personal purpose and "all general purposes flow down from it" (De Tienne 2005, p. 158). However, with the elaboration in semiosis, a form goes beyond the limitation of a personal purpose and acquires an objectively teleological nature in Peircean kind rather than Aristotelian. In Aristotelian teleology, the final purpose is the end expected state of an object. While in Peirce's semiotic philosophy that has affinities to Aristotelian view but now in an evolutionary objective idealist process philosophy, with the symbol as its central dynamic form. "Put briefly, … for Peirce every symbol is teleological in the sense that, being preoccupied with its own development into new interpretants" (De Tienne 2005, p. 157).

De Tienne (2005) owes the acquirement of the telic nature to two distinct functions of interpretant. First, an interpretant is being determined by the sign determining it to determine other interpretant relative to the object in a same triadic way the sign representing the object. Second, the interpretant also represents the very relation that the sign representing its object rather than the object merely, and thus provides another interpretant. The two functions help an interpretant anticipates other signs in two ways. The first function makes an interpretant anticipate the formation of other signs in mind, aka other interpretant. In cognitive semiotics, the anticipation helps a person form correct memory (Deacon 1997). The anticipation of an interpretant with the second function ensures the formation of signs embodying in the same triadic relation as the interpretant under similar circumstantial conditions in the future. Therefore, sign as the medium acquires the agency of replication in one's minds and in the future. "… there is a continuum or continuous history of anticipation that traverses any sign process from its origin within the dynamic object to its end in (teleologically) final interpretant" (De Tienne 2005, p. 158).That is, sign as a medium of communication of form acquires objectively telic nature in semiosis.

Information as the communication of form is processual. Using De Tienne's term, information is a process constituted by three dimensions: exformation, transformation and metaformation. Thus the object emanates form for the proximate purpose of attracting attention to it, and for the remote purpose of fueling the semiotic telic engine. This is exformation. Transformation is the process of transmitting the form emanating from the object. "Signing is the art of conveying forms through other forms." (De Tienne 2005, p. 163). Metaformation is the effect made by the proactive interpretant when influenced by transformation. As we can see, Peirce's theory of information is neither reductionist nor fundamentalist. The next question is how information manifests at the different levels of the living world and grow into knowledge adapting to different dimensions of the world but is incompatible with each other. This is what cybersemiotics tries to answer.

11.5 At the Center of Cybersemiotic Star

A riddle cybersemiotics tries to answer is that how to bridge the gaps between natural, social and human science (Brier 2014b, 2015a, 2016). Through integrating Luhmann's system theory and Peircean semiotics, especially its contemporary development, biosemiotics, Brier develops a transdisciplinary conceptual framework called cybersemiotics. He believes that gaps between the logical space of nature and of reason can be bridged and thus provides a comprehensive account of information with the framework (Brier 2014a). In this section, I will argue that the framework provides a convincible account of how information grows to knowledge in different fields and thus answers the riddle of information.

Following Luhmann, Brier argues that the living world can be modelled as a triple autopoiesis model consisting of three systems: the biological, psychic and socio-communicative system. "Autopoiesis" is a term created by Maturana and Varela to refer to organizationally closed, self-reproduced and self-identified system (Maturana and Varela 1979, 1987). A biological autopoietic system refers to a living system individual which we normally name it as a physiological system. However, the description of autopoietic system is qualitatively different from the description of physiological systems in the standard biological science. The former has an agency that is experiential and meaningful while the latter is a subject of mechanistic natural science from a third-person perspective. A psychic autopoietic system is a description of the living system from the first-person perspective.

Socio-communicative autopoiesis builds on biological and psychic autopoiesis but is qualitatively different from them. Both biological and psychic autopiesis are silent in the sense that they are still in biological sphere. First, socio-communicative autopoiesis has no extension. It is a pure semiosis consisting of symbolic connections. Second, it has an intrinsic form of organization that transcends the biological sphere. Through symbolic semiosis, it breaks through the limitation of individual autopoiesis and builds an inter-subjective sphere. "As psycho-biological beings, we live in symbiosis with the closed socio-communicative system that creates a culture and the intersubjective knowledge systems" (Brier 2008, p. 330). Brier thinks that Luhmann's system theory is not enough unless combining with Peircean biosemiotics. What distinguishes those three dimensions of autopoiesis are the ways of communication of form, namely semiosis or information, rather than their organizations or components. With the contribution of biosemiotics, Brier classifies four types of semiosis works in a socio-communicative system: endosemiosis, phenosemiosis, intrasemiosis and thought semiosis.

Endosemiosis refers to the semiosis that occurs within organisms, particularly those semiotic interactions at a purely biological level among cells, tissues, and organs. Phenosemiosis denotes to our inner feelings, perceptions, and volitions in their non-conceptual or prelinguistic forms that are not recognized by conceptual consciousness. There are also internal semiotic interactions between the psyche and the body different from endosemiosis. Brier calls it intrasemiosis. Thought semiosis describes semiotic interactions between the psyche and the language system. It not only makes some inner psychic states verbally expressible but also intersubjective communication possible. As we can see, these types of semiosis bridge the gaps between different levels of autopoiesis and different forms of autopoiesis at the same level. Endosemiosis happens between biological autopoietic systems. They make up a whole organism with the biological autopoiesis. As Brier says, we are still not clear about the relation between the biological and psychic autopoietic system (Brier 2008, p. 397). Intrasemiosis bridges the biological and psychic autopoiesis. Thought semiosis bridges psychic autopoiesis with socio-communicative autopoiesis. Every semiosis discussed here can be analyzed as exformation-transformation-metaformation process, aka information. However, sign games displayed at different levels of semiosis are different.

Endosemiosis consists of chemical signals among hormonal systems, signals in nervous systems, including the brain, transmitters in the immune system, etc. We should not confuse chemical signs conveyed in a living system with physical signals in an engineering communication system, like telecommunication system. The former help establish a second-order autopoietic system within a multicellular organism. The second-order autopoiesis means that every cellular in a multicellular organism is itself autopoietic and the endosemiosis happen between them constitute an autopoietic system again at a new level. It is an autopoiesis builds on autopoiesis. Actually, the emergence of autopoiesis at new levels is a distinctive feature of the living world. Based on the stipulation made above, it is convincible that similar sign games happen at the level of intrasemiosis.

Intrasemiosis is more about instinctual movements. Cognitive coupling, namely an instinctual movement ritualized and acquiring a value for a living system, happens at the level through coordination of behavior. He calls it languaging which termed by Maturana and Varela, but now in a Peircean semiotic context. Within evolution and life experience in which a human infant grows, sign games at the preliminary levels develop into language games. Our psyche is perfused with language at this level. Semiosis at each level creates a distinctive significantion. Endosemiosis creates structural couplings, intrasemiosis creates instinctual signification, together with phenosemiosis, thought semiosis creates conceptual signification. Together, they create individual signification sphere.[2] Within language games, the communication between individuals creates cultural signification sphere. It constitutes the cybersemiotic model of information, signification, cognition and communication and thus provides a unified framework of them.

The model is at the heart of the cybersemiotic star. Four branches of knowledge grow from that heart. Each branch explains a dimension of the world: matter/energy, life/living systems, inner life/consciousness and sense/meaning. Respectively, we divide the knowledge in different disciplines classified as natural, social and human science.

11.6 Pragmaticism and Complementarity

Brier (2016) argues that the spirit behind cybersemiotics, namely Peirce's pragmaticism, can answer Emerson's riddle of the Sphinx. Peirce defines pragmaticism as a maxim, "Consider what effects, that might *conceivably* have practical bearings, you *conceive* the objects of your *conception* to have. Then, your *conception* of those effects is the whole of your *conception* of the object" (Peirce 1931–1958, 438). In other words, the knowledge of an object is not only about the object but also the effects someone conceives the object to have. Put it differently, the knowledge of an object is a combination between the object and the effects the knower conceives of. We have no knowledge about pure objects. I find that pragmaticism implies the complementarity principle Bohr used to solve the conceptual dilemmas in quantum physics (Bohr 1937). Bohr proposed the principle of complementarity to overcome certain conceptual difficulties in physics (Bohr 1937). The difficulties come from the inconsistency between the fundamental principles of macrophysics and of microphysics. There are two paradigmatic inconsistences. First, according to physical theory, the precise position and the precise momentum of a macroobject studied by macrophysics can be determined simultaneously. While such determination is not possible for microobjects, which are subjects of microphysics, according to Heisenberg's Uncertainty Principle. Second, according to macrophysical theory, any macroobjects that are corpuscular (C) and not wavelike (W) will always be C and not W, irrespective of the experimental arrangement by which it is investigated, and vice versa. While, according to microphysics, the same microobject can be both C but not W, and, W but not C at different times investigated by different experimental arrangements.

[2] "Signification sphere" is a glossary created by Brier to denote the experiential, meaningful and significant world for an organism. It has analogue meaning with von Uexküll's "Umwelt", Maturana and Varela's "cognitive domain", and Hoffmeyer's "semiotic niche" but now in a cybersemiotic philosophical framework that draws on Peirce's semiotic view of evolution.

The way Bohr proposed to overcome the epistemological dilemma is the principle of complementarity. In order to solve the difficulties, Bohr first distinguished the phenomena that are explained by microphysics from the phenomena that are explained by macrophysics. The observed phenomena of a macroobject are independent of the experimental arrangements by which it is investigated. While the situation is different in the case of microobjects. We cannot explain the observed phenomena of a microobject irrespective of the experimental arrangements by which it is investigated. Then, Bohr redefined the phenomena of microobjects in a way different from the way define the phenomena of macroobjects. Instead of defining the phenomena by assigning properties to an object irrespective of the experimental arrangements with which it is explored, he argued that the assignment of the properties to microobjects is relative to the experimental arrangement used to investigate it. For Bohr, it is meaningless to assign a property to a microobject without combining with the related experimental arrangement. Therefore, different from macrophysics, the same microobject under two different experimental arrangements used by which to investigate it are two different phenomena, and thus two different things. For Bohr (1937), these two pairwise phenomena stand in a relation of complementarity for an observer. Thus, the principle of complementarity helps get out of the epistemological dilemma.

Bohr (1937) believed that the principle can be generalized and extended to fields other than physics but did not argue it in detail. Lindenberg and Oppenheim (1974) fulfil Bohr's wish. They reformulate the epistemological dilemma in physics as assignment paradoxes. A person *P* encounters an assignment paradox relative to a character *Ch* if and only if (a) according to *P*, *Ch* is intentionally permanent; (b) there are entities$_1$ (in domain$_1$) with respect to which the assignment of *Ch* by *P* are *de facto* permanent; (c) there are entities$_2$ (in domain$_2$) with respect to which the assignment of *Ch* by *P* are not *de facto* permanent. The assignment paradox can be removed by redefining the object investigated. In the situation of encountering an assignment paradox, we should not separate the object and the context in which it is investigated. That is, the same object investigated in a different context are different things. Then the assignment paradox is removed. Formally, we can define complementarity as: Given characters *Ch'* and *Ch"*, and given mutually exclusive contexts *C'* and *C'*, then two phenomenon *Ph'* and *Ph"* is complementarity for a person *P* if and only if: (a) *P* is confronted with an assignment paradox relative to *Ch'* and *Ch"* if he assigns them to entities *per se* in domain$_2$; (b) assignments of *Ch'* and *Ch"* by P to the entities depend on *C'* and *C'*; (c) the assignment paradox is removed by assigning *Ch'* and *Ch"* to *Ph'* and *Ph"* respectively rather than the entities *per se*.

Isomorphically, given physical information as Phy, referential information as Ref, and normative information as Nor, we can construct the assignment paradox of information as: (a) A person *P* intentionally assign characteristics Phy, Ref and Nor to information at the same time; (b) there are entities in domain$_1$ with respect to which the assignment of Phy, Ref and Nor by *P* at the same time are *de facto* permanent; (c) there are entities in domain$_2$ with respect to which the assignment of Phy, Ref and Nor by *P* at the same time are not *de facto* permanent.

Similarly, the assignment paradox can be removed by complementarity in information studies: Given Phy, Ref and Nor, and given mutually exclusive scientific theories of information, then phenomena Ph(Phy), Ph(Ref) and Ph(Nor) are complementarity for a person *P* if and only if: (a) *P* is confronted with an assignment paradox relative to Phy, Ref and Nor if he assigns them to information *per se* in domain$_2$; (b) assignments of Phy, Ref and Nor by *P* to the entities depend on relative particular discourses;[3] (c) the assignment paradox is removed by assigning Phy, Ref and Nor to Ph(Phy), Ph(Ref) and Ph(Nor) respectively rather than the entities *per se*.

According to the formulation, physical, referential, and normative information are actually different phenomena. It is elliptical and meaningless to talk about information *per se* in information studies. We cannot separate information from the context in which it is investigated. Physical, referential and normative information stand in a relation of complementarity for researchers. This is why Brier argues that there are four branches of knowledge in cybersemiotics star rather than constructs a reductionist hierarchical or fundamentalist model of semiosis and knowledge. In a nutshell, with Peirce's theory of information, cybersemiotics and the complementarity principle in pragmaticist sense, the conflicts and inconsistencies in information studies can be understood as perspective conversions. When we converse our perspectives, the theoretical contexts in which we investigate information changes. It is meaningless to talk about information without combining with the related theoretical context in which it is investigated. Therefore, this is why methodologically reductionist theories are too limited to give a complete account of information, and fundamentalist theories are doomed to fail. This is also why cybersemiotics star is necessary for information studies.

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[3] I assume there would be a discourse by means of which Nor is investigated.

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Chapter 12
From 'Motivation' to 'Constraints', from 'Discourse' to 'Modeling System': Steering Multimodal Critical Discourse Analysis Towards Cybersemiotics

Sara Cannizzaro

Abstract Much contemporary applied, and externally-funded research requires interdisciplinarity to tackle complex world problems for sustainable future living, especially in the sciences. However, interdisciplinarity is a more difficult approach to adopt in the humanities, as these tend to remain largely skeptical about confronting ideas, findings and methods from the sciences. In order to counteract disciplinary insulation in the humanities, this chapter will attempt to integrate ideas originally developed in the sciences into established theories in the humanities. It will do so by proposing, firstly, to substitute the multimodal notion of 'motivation' (Kress 1993) for a less anthropomorphic notion of context, conceived broadly as cybersemiotics *constraints* (Brier 2008, 2009). This reconfiguration of context allows the cultural analyst to identify the feelings-emotional, environmental, physiological, erroneous, and second-order cybernetics' observership constraints of verbal communication and culture. Secondly, this chapter will also argue that the originally mathematical idea of *modelling system*, developed in semiotics by Chernov (1988), Lotman (1967) and Sebeok (1988), and resonant of Brier's cybersemiotics, would be more appropriate for cultural analysis rather than 'discourse'. This reconfiguration of discourse into modelling system could enrich Critical Discourse Analysis (CDA), including the multimodal type, on the basis of its pragmaticist, qualia-rich and phylogenetic stance. The benefit of such integrative initiative is that a cybersemiotic-inspired analysis of discourse in culture, can produce interpretations driven by a new *polis*, one that is not so much self-obsessed with the unicity of the human-animal species, and that always situates culture and society within a wider ecosystem.

Keywords Interdisciplinarity · Motivation · Cybersemiotics constraints · Modelling system · Discourse

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12.1 Introduction

The study of culture without an awareness of its relation to nature is no longer an option in the twenty-first century (Cannizzaro 2014). For complex world problems to be tackled for sustainable future living, there ought to be a collaboration between the sciences and the humanities. In the humanities, a disciplinary insulation approach results in ignorance of key results and methods developed in the sciences. If ignorance were not enough, typically it is sometime feared that scientific ideas may bring questionable and unethical ideas into the humanities. For example, the concept of 'control', so dear to cybernetics, is almost a dangerous one to mention in cultural studies – it brings about ideas of atomic warfare and technocratic management (Wolfe 1998, p. 78), while the equally relevant idea of self-organization, also associated with control is largely ignored, or at best, separated from its origin in cybernetics. Or, another subtler but not less significant example is that in cultural studies, gender is typically seen as a construct entirely divorced from sex, hence to the entirety of a human being's physiological constitution. This conception renders experience, including experience of the self, a wholly disembodied experience. While this approach bears the practical benefits of counteracting long-standing and culturally ingrained social divides manifest in sexism and gender discrimination, it is nevertheless guilty of presenting at the very least a partial picture of the human animal self, one in which mind and body are constantly and fixedly divorced from each other. This is hardly a scientifically acceptable idea given the dynamic and complex nature of the human-animal self.

Something to consider whilst humanities ignore the sciences, is that the sciences can get on pretty well without us humanists: million dollars' mathematical problems are solved, the latest technology is developed, and its implementation is promoted on a wide scale with much economic remuneration, at least for a lucky few. But without an interest on the humanists' side for scientific endeavors, and to probe such endeavors, such new scientific developments may end up ignoring basic and fundamental aspects of what makes us human, or better, human animals – that is, happiness, sustainability, trust, meaningfulness, to name a few.

By not mixing with the sciences, often due to idealisms, the humanities are themselves guilty of not doing enough to tackle these important problems at their roots. Indeed, their disciplinary insulation becomes a cause (though to be fair, not the sole cause) of neglect on the side of the sciences. This neglect then translates into lack of funding for the so-called classical subjects, which potentially diminishes the importance of humanities amongst prospective students, a process that in the long term will make us less of a human animal. That is why we need an awareness of the sciences, and we need interdisciplinarity, and interdisciplinary enterprises like cybersemiotics in the humanities, and particularly the study of culture. This chapter will provide an indication as to how scientific endeavor and related concepts can enrich humanist understanding. It will do so by projecting the cybernetics-inflected notions of 'constraints' and 'modelling' onto the cultural studies' classical notions of 'motivation' and 'discourse'.

12.2 From Motivation to Cybersemiotic Constraints

Kress's notion of motivation (1993) takes a position on a long-standing debate in semiology on the nature of the relation between the two components of the sign, according to Saussure (1983 [1916]), the signifier and the signified. Saussure in fact argued that within the context of *la langue*, such a relation is 'arbitrary', whereas Benveniste (1970 [1949]) demonstrated that it is 'necessary'. Semiologists have typically taken a position that mediates between the two sides of the debate. For example, by means of reference to Peirce' semiotics, Fiske (1990, p. 46) explains that Saussure's followers recognized that the physical form of the sign [signifier]… and its associated mental concept [signified]… can be related in an *iconic* or *arbitrary* way. Coupled to this solution to the necessary-arbitrary linguistic debate, Kress argues against the arbitrariness of sign relations altogether in favor of necessity, which he calls 'motivation'. To do this, he brings the example of a three and a half year old child who drew seven ugly circles of different sizes on a piece of paper and said "this is a car". Kress (1993) argues that the child's drawing, taken as a sign, has been 'motivated' by the object he observed and by his context of observation, that is, "his place in the world, physically, cognitively, socially, culturally, conceptually" (p. 72). However, one could argue that understanding 'context as motivation' is not enough. In fact, when considering signs produced by the human being, one ought to remember that it is signs produced by a human animal that are being considered – hence the context of such signs must be, at least at root, of the same broad type as the context of other non-human animals – in other words, have *some* underlying overlap with it. That is why a less anthropocentric notion of context, to start with, is needed.

In this respect, the idea of 'context as motivation' is ill-conceived because it suggests that "the relations of motivation between signs and their users is supposedly subject to an act of will" (Cobley 2007, p. 51). In other words, the term 'motivation' may dangerously support "the humanist imperative in respect of signs… [which] re-casts motivation as an entirely voluntarist affair" (p. 51). Instead, as Cobley underlines, although "Althusser does suggest that humanism has its uses… he is absolutely forthright about the need for absolute anti-humanism in theoretical work" (p. 52) Hence, there emerges the necessity of substituting the anthropocentric notion of 'context as motivation', for a less anthropomorphic notion of 'context as cybersemiotic constraints'.

Cybersemiotics (Brier 2008) can be useful to frame contextual constraints, due to its links with Peirce's *realist* stance, Deely's *biological* stance and Sebeok and Danesi's *physiological* stance. Peirce's scholastic realism, as embedded in cybersemiotics, can provide a richer, anti-humanist grounding for understanding context than the voluntarist idea of motivation. Peirce's 'scholastic realism' consists in conceiving that there is a reality that is independent of animal, including the human-animal, experience of it. As he states, the sense in which the pragmaticist uses the world 'real' is "that is real which has such and such characters, whether anybody thinks to have those characters or not" (Peirce 1955b, p. 264). Indeed, "The usefulness of some signs… consists in their being connected with the very thing they signify" (Peirce 1955a, p. 234). For Peirce, feelings provide a tight connection with reality. As he argues "so far as the sensation is a mere feeling of a particular sort, it is determined only by an inexplicable, occult power; and so far, it is not a representation, but only the *material quality* of a representation…" (Peirce 1955c, p. 238, my italics). This passage seems to suggest that emotional experience is 'qualified' by there being a world out there, hence is intrinsically connected to this world). Thus, far from being the result of free will, emotions are constrained by the reality that they reflect and whose material quality they embody.

Also, one of the contextual constraints embedded in cybersemiotics, could be usefully understood through what Deely calls 'the biological type'. According to Deely (2009), "the interaction [of two or more physical substances] partially specifies and determines the awareness of the animal (*species impressa*) semiosically to form and construct a further awareness of its own (*species expressa*) transforming the bare physical into an objective world with which the animal can and must deal according to its *biological* type" (p. 343). In other words, far from being an unconstrained act of will, meaning is always constrained by the biological embodiment and ecological situatedness of semiotic experience. Deely's reminder of the framing impact that the 'biological type' has on meaning-making, means that, for example, to 'read media texts' or to interpret the use of technology, one needs to envisage in addition to *emotion*, also *physiology* and *ecology* as the legitimate contextual constraints in which culture operates. This idea also resonates with Sebeok and Danesis's Modeling Systems Theory (2000), according to which human-animal communications are arranged over three, phylogenetically connected layers, i.e. the physiological, the linguistic and the cultural. The first layer, the Primary Modelling System, corresponds *grosso modo* to Peirce's category of firstness (Sebeok and Danesi 2000, p. 10), the feelings which provide an intrinsic connection with reality, and to Deely's *biological type*.

Such contextual constraints –the realist, the biological type, the primary modelling system, can be dubbed 'cybersemiotic' because they broadly correspond to Brier's notion of *cybersemiotic information*, a perspective which holds that an organism's individual point of view is created by "bodily interactions with environment and creation of a signification sphere" (Brier 2008, p. 392). Both notions of cybersemiotic 'information' and cybersemiotic 'constraints' could be aligned on the basis of their insistence on a contextual understanding of information that must include both the semiotic and the cybernetic aspect of modelling. However, context is here referred to 'constraint' rather than 'information' because this chapter seeks to solve a problem within the humanities rather than the sciences. As Cobley argues, the humanities, have tended to overstress agency (2010b, p. 241) and have hence been more in need of a theorization of constraints than the first person experience that Brier's 'cybersemiotic information' stresses in order to make scientific knowledge more feelings and first-person aware. In light of this elucidation, one may argue that meaning in culture, including linguistic aspects of culture, is contextualized within both semiotic and cybernetic constraints, that is (1) feelings emerging through *abduction,* (2) *environmental* constraints, and (3) *physiological* constraints,

(4) theories of *error*/distortion, to account for misled meaning-making but also by (5) a theory of the *observer* which is applicable to all these levels of constraint.

On the one hand, (1) emotions (through abduction) constrain meaning-making by means of *previous experience*. Hence one may argue that an aspect of reality becomes relevant to a living system only when the system itself has already a model of that reality stored in the form of emotion within a wider web of other emotions. For example, fossil hunters are more likely to distinguish fossil from scattered unfossiliferous rock in a geological layer when they have previously seen and touched the kind of thing they are looking for first. This previous experience forms an experiential-emotional model, which in turn becomes the *antecedent cause* or the antecedent constraint of semiotic information. On the other hand, it is also *future causes*, or emotions triggered in the present by future objectives that constitute the emotional context of information. As Kull et al. (2009) affirm, "teleological processes that are specially organized with respect to specific ends or referents are unique to living systems" (p. 168), hence teleology is a defining feature of semiosis. This view is supported by the fact that Sebeok (1979a) himself declared that "the ideal of semiotic analysis is to combine causal with functional [teleological] explanation – to show how sign form interrelates dynamically with sign function" (p. 13).

This contextual constraint of meaning-making could be related to two notions in cybersemiotics: Firstness, which constitutes Level 1 of cybersemiotics' unitary philosophical framework for all sciences (Brier 2008), and also the second 'leg' of the cybersemiotic star (Brier 2009), that of the inner world of emotions. Derived from Peirce, firstness is a primary chaotic level of continuity that includes quality, pure feelings with the tendency to take habits and thus potentiality of systems emergence (Brier 2008, p. 389). Here, the Peircean-inspired cybersemiotics' idea that randomness and chaos precede lawfulness, or the emergence of systems, is relevant: "If chaos is basic, one cannot explain it with the absence of law, because chance or randomness precede law. Thus one must rather explain law from randomness, not the reverse. Chaos, chance and randomness must therefore be understood not only as emptiness but also as fullness, as hypercomplex dynamic processes that include characteristics of mind, matter and life" (Brier 2008, p. 200).

Also, the emotional context could be related to the second leg of the cybersemiotic star. This levels amounts to "the inner world of emotions, will, drives, affects and thoughts, manifested as mind and consciousness" (Brier 2009, p. 56). In addition, in order to account for both feelings (firstness) and emotional constraints (the inner world of emotions) one needs to also take into account second order cybernetic theory of the observer, and thus the idea that feelings and emotions may be present in both the *observed* system and the *observing* system. A personal worldview would also be constrained by (2) environmental framing, the realist stance of context. Simply put, one cannot form a model of something if there is not a 'something', or, as Brier puts it, 'The entire idea of perception will collapse if we do not attribute some independent reality to "things"'(Brier 2008, p. 185). How can a system perceive, emerge, and thrive if a world is lost? This type of context can be related to Secondness, a causal level of matter which includes atoms, molecules, energy, forces (Brier 2008, p. 389). Mapped onto the cybersemiotic star, this type of context could amount to the third 'leg' of the star, the physico-chemical informational environment of the natural world (Brier 2009, p. 56).

Also, meaning-making is constrained by physiological availability (3). One may argue that when Sebeok (1991a [1988]) brought to the forefront Jakob von Uexküll's concept of *Umwelt* or sensorial world, he wanted to underline the fundamental role that sensorial framing, or the inner anatomical structure of the species itself plus the kind of innate modeling capability it possesses, has in shaping the organism's personal world view. Indeed, Sebeok was also aware that sensorial framing does not just apply to the observed system, but also to the observing system (1979b), hence both environmental and physiological framing may need to be included due to the constraints of the context of observation. Physiological constraints then can be related to the first 'leg' of the cybersemiotics star, with "body-hood as the source of life, which we share with other living species (Brier 2009, p. 56).

Physiological availability can also be read through Nedergaard Thomsen's (this volume), idea of biological contextual background. This includes the capacities to behave, to act and interact. Elaborating further on these capacities, Nedergaard Thomsen explains that the biology of communication includes its phylogenetic and ontogenetic aspects, that is, the evolution and development of the language faculty as well as the physiology of speech as a sensory-motor phenomenon (2011). This includes the physiological level of the vocal production and auditive perception of speech, as well as the capacity for coordination of coordination of behavior. This latter capacity can be related to *autopoiesis*, the organisms' capacity to "transform matter into themselves in a manner such that the product of their operation is their own organisation" (Maturana and Varela 1980, p. 82). As Nedergaard Thomsen (2011) reminds us, *Cybersemiotics*, makes it clear that biological systems are autopoietic, hence autopoiesis is a key aspect of the physiological context of communication.

Additionally, there is a fourth constraint to take in consideration, that is (4) the role of error, which may occur when interactions between knowledge arising from feelings and emotions, physiology, environment and mind, are and/or feel indeed misaligned. Through his concept of 'object', Deely (2006) reminds us that our view of the world may be objective (known) but deviant from a physical situation (the 'thing', which is independent from our perception of it) rather than coincident with it and in so doing he hints at the role of error in signification. Error "may help to make the third factor [the interpretant] evident, but removal of error does not at all take the third factor away" (p. 45). The proof is that an organism is still capable of building a picture of reality that 'makes sense' even when this is not accurate. It has to be remembered here that 'error' does not necessarily have, although it does not exclude, a negative valence, as it often constitutes the basis for learning. In fact, as essay-marking experience commonly shows, students aware of their own disabilities and that are likely to put three times the effort into their coursework than their able classmates, end up performing better than most of their classmates. Thus, 'error' needs to be considered on the basis of both its disabling and enabling capability, which, to a large extent, may be considered as two sides of the same coin and as the root to creative problem-solving, adaptation and personal as well as cultural growth. Valuable theories of error that account for constraints in meaning-making have been proposed by Wilden (1980), Serres (1982), and Sebeok (1991b). But, specific theories of error too, especially within the context of sensory disabilities as these may shed light on the working modes of sensorial framing in general and how this sustains the interpretation of culture.

Lastly, meaning-making in culture cannot ignore Second Order Cybernetics' (von Foerster 1973; Maturana and Varela 1980; Luhmann 1986) explicit efforts to insert (5) a theory of the observer within any theory of observation, thus within science in general. As Brier (2008) states, "we must (…) acknowledge that we are observers co-existing in language with other humans in culture and society" (p. 119). As Cobley (2010a) notes in fact, "the future of research in the sphere of biosemiotics will be enhanced by a greater understanding of 'observership'" (p. 2045). Hence all levels of the contextual constraints to meaning in culture and language, including the feelings-emotional, environmental-physiological and error-based constraints, have to also be envisaged within the context of observership.

12.3 Discourse and Jamesian Subjectivist Pragmatism

The second notion that is frequently used in the humanities and that would benefit from an interdisciplinary reframing, or at least, contextualization, is 'discourse'. Here, I will not question the use and purposefulness of the notion, but I will simply outline some of the implications for theoretical soundness and for analysis, of the linguistic bias with which the notion of 'discourse' is endowed with. As Cobley has outlined (2006), since the example set by Barthes in *Mythologies* (1957), cultural studies, and particularly media studies have strongly suffered from glottocentrism. That is because analyses of culture have very often been performed on the principle of Saussurean linguistics. This trend upholding the centrality of language in determining human systems of ideas, values and knowledge, can be traced back to the work of Benjamin L. Whorf (1956) and to the 'linguistic turn' in social thought which was inaugurated by Richard Rorty's 1967 collection (Cobley 2007, p. 45). The linguistic turn gave rise to the idea that knowledge is "constructed in discourse" (Cobley 2016, p. 18). Then, discourse studies, along with semiology, thrived in the humanities in established disciplines such as linguistics (Cobley 2016, p. 19), cultural studies, and particularly education (see for example the review of discourse studies in education by Rogers et al. 2005). Analyses of culture carried out within the broad spectrum of discourse have been labeled with the term Critical Discourse Analysis. (CDA).

CDA is an expression that appears to have first been used by Fairclough in an article published in 1985 (Fairclough in Breeze 2011), but was popularised by Fairclough's influential book *Language and Power* (1989) and developed by Wodak (1996) and van Dijk (1997). Today, CDA is widely practiced in cultural studies in Australia and Europe. There are different schools of CDA, but essentially the common purpose that all CDA analysts share is that of de-mystifying ideologies (Wodak and Meyer 2009, p. 3). The focus of CDA is thus on investigating the role of discourse in the (re)production and challenge of dominance (van Dijk 1993, p. 249), and on the dynamic functions of (social, cultural, situative, cognitive) *contexts of language use* (my emphasis) (Wodak and Meyer 2009, p. 2). As evinced by the emphasis on 'context of use', the grounding of CDA is in pragmatism. It therefore could potentially fit with cybersemiotics' pragmaticist semiotic foundation, were it not for the fact that CDA lacks a realist philosophical foundation, as I will argue below.

That the grounding of CDA is in pragmatism, is clearly declared by Wodak and Meyer (2009, p. 2) when they state that the roots of CDA are in linguistics and pragmatics, amongst the other things. The pragmatic tradition I am referring to here, is the branch of linguistics developed in the last 60 or so years, partly from Austin, Searle and Grice, which developed into such forms as 'relevance theory' (e.g. Sperber and Wilson 1995). However, pragmatism also developed separately as a philosophical tradition through the work of William James and Charles S. Peirce. The two aforementioned traditions, that is, the linguistic 'pragmatic' tradition *and* philosophical pragmatism, have been developed by different scholars and thinkers in different domains. However, they both centre on the study of 'what works' in a general system of knowledge, and on how this is determined. However, given that Rorty, the linguist, was a follower of William James (Rescher 1995), the philosopher, the study of context of use in linguistics seems to have leaned on James' subjectivist pragmatic philosophy rather than Peirce's realist one.[1] For example, let's consider Rojo and van Dijk's (1997) view on that: "Discourses produce knowledge. They present specific versions of reality, formulate characteristics of social actors and groups and thus sustain and reinforce ideologies and social values. However, as with people, not all discourses are equal. Some are dominant or legitimate, others are not or are less" (p. 561).

This view focuses on dominance and the legitimacy of knowledge and realities produced in discourse, but eschews any discussion of the objectivity, truthfulness or realism of such knowledge within a context of what actually works. That is because the pragmatic approach embedded in CDA appears to be fundamentally grounded in a Jamesian or subjective pragmatism rather than in a Peircean realist pragmatism (Rescher 1995). In fact, the former focuses on 'What works for X' in proving efficient and effective for the realization of a particular person's (or group's) wishes and desires, whereas the latter focuses on 'What works impersonally' (Rescher 1995, p. 7127). It is for this reason, and the idea of a concept of truth that can only be sustained in a realism, that Peirce himself renames his pragmatic approach as 'pragmaticism' (Peirce 1955c [1906]). In this respect, Cobley affirms how the nominalism of the 'linguistic turn' is at odds with the Peircean realist perspective in biosemiotics (Cobley 2016, p. 18), and the realist perspective embedded in cybersemiotics too, as outlined above. Therefore, the discourse scholars have reduced

[1] Here I am avoiding to refer to Peirce's as an *objectivist* pragmatism, as Rescher (1995) called it, because I uphold the notion of objectivity only in the sense intended by Deely i.e. as purely objective reality (2009), as mentioned in the previous sections above.

culture to discourse *viz* the idea that the world is "constructed in discourse". This reductionist approach is not unlike that of Barthes-inspired semiologists (Barthes 1957; Goffman 1979; Schrøder and Vestergaard 1985; Williamson 2002) which reduced culture to myths, representations and false realities, in their intent to uncover the power relations subsumed in cultural texts. The lack of a fundamentally realist perspective in CDA, then, is its key philosophical shortcoming.

12.4 CDA and the Information-Transmission Model

Another reason why cybersemiotics' pragmatism differs from CDA's pragmatic tradition is the latter's reliance on a transmission model of information. There are to date a number of critiques of CDA (for example Cobb 1994; Slembrouck 2001; Haig 2004; Tyrwhitt-Drake 2005; Rogers et al. 2005; Breeze 2011). These have not been explicitly carried out from a semiotic perspective, but they often approach semiotic endeavors and as such could be enriched and supported by a biosemiotic and cybersemiotic contextualization. For example, Breeze (2011) outlines how CDA leans on a seriously dated "transmission model of hermeneutics whereby linguistic forms "convey" or 'construct' meaning" (p. 510). Indeed, she argues that "it is possible to maintain that language use determines cognition" (p. 508) but "it is unreasonable to assume a one-way influence from discourse to thought, and methodologically unsound to operate as though the existence of such an influence were unproblematic" (p. 509). Despite being so ill-conceived, this on one-way influence from discourse to thought is explicit, for example, in van Dijk's (1993) statement according to which "Metaphorically they [discourses] may be seen as cognitive programs or operating systems that organize and monitor the social attitudes of groups and members" (p. 258). Instead, if one was to conceive information as consisting of several layers or constraints, then it is easy to see that discursive information is not something that can be simply transmitted. So, if the cognitive program metaphor is useful from a purely practical perspective to outline the structural inequalities represented in media texts, why not substituting it with an organismic metaphor, as that subsumed in cybersemiotics? Here information arises out of a complex web of cybersemiotic constraints as outlined above, where human-environmental systems are open, where control is *not* exercised by a single central program, and where self-organization is contemplated in its organizational tendencies.

In fact, the obvious consequence of envisaging discourse as a program, and communication as an act of transmission, is the theorization of a problematic naïve recipient. According to van Dijk (1997, p. 4), CDA's whole point should be to provide insights into structures, strategies or other properties of discourse that could not readily be given by *naïve recipients* (my emphasis). The problem with this expression, in addition to underling its reliance on a transmission model of communication and information, is that it essentially envisages a dumb reader and a clever analyst; if what distinguishes the reader and the analyst is the access to method and theory, and if the analyst is indeed in a privileged position to make sense of discourse, then CDA analysis “runs the risk of losing sight of whatever spontaneously productive ‘hermeneutics’ there already are in the lifeworlds” (Rabinow in Slembrouck 2001, p. 42 and Breeze 2011, p. 511). The consequence of this assumption is the missing out on a lot of what makes up interpretation, on what the participants actually think, or feel, on what is dynamically happening in and through a text. In other words, CDA risks equating spontaneity with naivety, in itself an ideological view that stresses the supremacy of reason over those automatic, non and pre-linguistic processes we cannot easily control, upon which emotions are built. Cybersemiotics instead gives serious consideration to this layer of communication, for example by bringing to us Reventlow’s ethological notion of *rependium* (cited in Brier 2008, p. 167), defined by Brier as an act of insight which brings about structural changes in the animal’s behavior. There is no ‘rependium’, or even a broad conception of *qualia*, accounted for in the idea of naïve recipient, or that of discourse as a monitoring program. On the other hand, cybersemiotics’ emphasis on the qualia aspect of information stresses the key role of feelings in constituting information, including the information that make up discourse!

12.5 Discourse as a Modeling System

Furthermore, Breeze explains how CDA has a specific interest in the way *language* contributes to, perpetuates and reveals the workings of ideology and power in society (2011, p. 495). Also, CDA is said to emphasize the relationship between language (text, discourse) and power (political struggle, inequality, dominance) (Weiss and Wodak 2002, Breeze 2011, p. 495). The emphasis here is on the link between language and power, not communication and power. Breeze (2011, p. 502) also outlines the traditional three-level framework used in CDA: language operates on an ideational level (construction and representation of experience in the world), a relational level (enactment of social relations) and a textual level (production of texts). In both instanced, it is evident that CDA misses to situate ideology, power and language within a more complete model of communication. In fact, the lack of reference to the reality-reflective level of language – is being framed by our biological type - is rather striking. That is because language, as outlined by Sebeok (1988), is a species-specific trait of Homo sapiens. Hence the reference to the traditional three-level framework used in CDA could include a reflective level in which language is intertwined with the biological history of communication, that is, its evolutionary function. This would amount to a model of culture that conceives language –intended as externalized verbal communication – as a subset of the human animal’s broad communication capabilities, and not as the main set (Sebeok and Danesi 2000).

The omission of the reflective level of communication and of its adaptive function denotes a lack of interest in clarifying theoretical premises of language, and is perhaps unsurprising: Rogers et al. (2005, p. 377) found in a review of 39 articles using CDA in education, that more than a quarter did not address language theory at all. So, despite the fact that CDA scholars do intend to capture non and pre-linguistic signs in their analyses, e.g. the study of action and interaction, or gestures, images, the internet and multimedia (Wodak and Meyer 2009, p. 2), they fail to acknowledge the bigger picture when it comes to theoretically situating language within a broader communication framework. As such, CDA scholars reduce the entirety of the evolutionary communication repertoire available to the human animal to its linguistic capabilities. This means that discourse analysis, much like semiological analysis (Cobley 2007), is carried out on the principles of linguistics even when it seeks to analyze non and pre-linguistic communication. This flaw vitiates any claim made as to the scientific validity of critical discourse analyses of culture.

To a similar extent, this critique can be moved to multimodal discourse analysis. As the proponent of a form of analysis of culture which takes into account modes of communication that are not solely verbal, Kress and van Leeuwen (2006) proposed a 'multimodal' analysis that can unlock the "grammar of visual design" and "encompass oil painting as well as magazine layout, the comic strip as well as the scientific diagram" (p. 3). However, a linguistic metaphor remains the basis of their multimodal approach, and of further approaches integrating multimodality with discourse analysis (Fairclough 1989; Wodak 2001) to create multimodal discourse analysis (e.g. O′ Halloran 2004; Jones 2012; Machin and van Leeuwen 2016). Despite the efforts to account for nonverbal form of communications in cultural analysis, linguistic metaphors as 'grammar' and 'discourse' remain the core of the analytical toolkit, maintaining such approaches glottocentric at their very roots.

Cybersemiotics can offer an alternative viewpoint to the study of discourse in culture, because its inclusion of the biological aspect of communication as outlined in the cybersemiotics star, can support an evolutionary view of culture as a whole. Overall, an alternative approach to the nominalist, anthropocentric and computational model of culture outlined so far, would posit culture as communication, and discourse - seen as a specific instance of culture - as a specific type of *modeling system*, one describing power relations. Originally a mathematical term (Chernov 1988), the notion of modelling system was developed in the work of Lotman (1967, 1990) and Zaliznajak et al. (1977), both of whom had close links with cybernetics (Cannizzaro 2014). The notion of 'modeling system' brings about the *structural* aspect of signification, that is, that the activity of producing forms (modeling), that relies on *patterns* of production that can cut across nature and culture (hence the transdisciplinary aspect of modeling). Because these patterns possess a 'structure', they can be considered 'systems' (i.e. a set of elements and their relations) or more specifically, 'modeling systems', identified by Lotman as "The structure of elements and of rules for combining them that is in a state of fixed analogy to the entire sphere of an object of knowledge […]" (Lotman in Sebeok 1991a, p. 50).

For Lotman, the functioning of Primary (speech) and Secondary Modeling systems (arts, literature, culture) is embedded in the 'semiosphere' (Lotman 1967, 1990). Lotman formulated the semiosphere as a model to describe culture synchronically but also historically. The semiosphere investigates not just how information is transmitted through culture, but how new information is generated through it and how information is preserved in collective cultural memory (Lotman 2001 [1990]: 2). Sebeok recognized the fundamental contribution that Lotman and Soviet scholars brought to semiotics with their emphasis on modeling, which implies a necessary concept of space, history and innovation through translation, and their emphasis on the derivational character of culture in relation to verbal communication. However, Sebeok developed this extentionality notion further by emphasizing *the derivational character of verbal communication from nonverbal communication*, two levels which Lotman and other 'Soviet semioticians' at the time, had collapsed into a single modelling system, the 'primary modelling system'. Clearly disentangling primary modelling system from secondary modelling system, Sebeok posited that primary modelling includes only externalized nonverbal signs, and excludes externalized linguistic signs, even while it harbours their potential. Secondary modelling system instead included systems of externalized, verbal signs or speech (Sebeok 1988). It is with Danesi that Sebeok adds a tertiary modeling system to the framework – that of cultural superstructures (Sebeok and Danesi 2000).

Sebeok and Danesi's Modeling Systems Theory (2000) in fact propose an extensionality principle which suggests that modeling systems are phylogenetically connected to each other, i.e. the primary modeling system (nonverbal communication plus a sophisticated capacity for cognitive differentiation) is the precondition for secondary modeling system, whereas this latter (verbal communication) is the precondition for the tertiary modeling system (cultural communication, and discourse). As mentioned earlier, critical discourse analysts usually lack a valid theorization of language and possesses no valid notion of nonverbal communication, yet much in a Modeling Systems Theory fashion, one of their aims is to provide thick historical-contextual descriptions of discourses; only, within the framework of Modeling Systems Theory, the history of man's discourse would be set against the history of life, alas, evolution!

Together with Sebeok and Danesi's Modeling Systems Theory (2000), Brier's cybersemiotic model of communication also constitutes an important step for a non-anthropocentric vision of human communication, culture and discourse. Brier in fact defines cybersemiotics as a 'development of biosemiotics achieved by combining the latter with, among other things, Niklas Luhmann's work (Brier 2008, p. 392). As he explains, the three levels that Luhmann envisages – biological, psychological, social - are interconnected and do interpenetrate – that is, use each other as environments and form mutual structural couplings, thus accounting for both semiotics and cybernetics' insights. Brier (2008, p. 393) acknowledges the need to conceive the interpenetration between the biological, psychic and social autopoietic systems as the *signification sphere* that surrounds the organism. Such a sphere is traversed by communications. Here Brier, much like Sebeok (1988) and Sebeok and Danesi (2000), is clearly echoing Lotman's notion of semiosphere, and particularly its structural, developmental, functional, hence fundamentally pragmatic character.

Brier's underlining of Luhmann's concept of interpenetration among biological, psychological, social levels is useful theoretical evidence, which in addition to Modeling Systems Theory's insight, supports an overall evolutionary view of culture. That is because integrating Luhmann's concept of interpenetration across biological, psychological and social systems within a biosemiotics terminology allows for a more comprehensive categorization classification system. This view holds that when one envisages studying the human, one will necessarily confront the biological. The same point can be made in respect of the critique of CDA from *within* CDA. As Breeze explains, those carrying out CDA analysis are expected to clarify their own political inclinations and bias, before providing their interpretation of the text. Traditionally left-leaning, however, such interpretations "might equally be challenged from the right, or from any other political dimension that might exist" (Breeze 2011, p. 501). CDA, then, including multimodal CDA (e.g. O'Halloran 2004) would be enriched by interpretations driven by a new *polis*, and particularly, one that is not so much self-obsessed with the unicity of the human-animal species. A new *polis*, would also situate culture and society within a wider ecosystem, where this latter expression is not used as a mere metaphor as in much of cultural studies. As Cannizzaro and Cobley (2015, p. 220) stated, "biosemiotics has a bigger fish to fry than traditional political approaches that signal the tyrannies of language". The same point can made about cybersemiotics, which by bringing about realism, phylogeny, and *qualia* in discourse studies, offers an opportunity to completely recapitulate the politics of critical and multimodal discourse analysis.

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Chapter 13
Towards a Cybersemiotic Philology of Buddhist Knowledge Forms: How to *Un*do Objects and Concepts in Process-Philosophical Terms

Alina Therese Lettner

Through the triadic leap of semiosis, as I call it, our reality comes into being as signs.

Søren Brier, *Cybersemiotics: Why information is not enough* (2008).

Abstract The aim of this chapter is to set out the basic coordinates of a cybersemiotic philology of Buddhist knowledge forms in order to further develop the non-anthropocentric dimensions and process-philosophical potential of both Buddhism and Peircean semiotics. This is also meant to lay the foundations for an interculturally and philologically enriched cybersemiotics. Proceeding from the logical conception of philosophical categories and their philological explication, the transdisciplinary model of a semiotic philology of thought forms (Lettner, diss. thesis, forthc.) develops an intercultural explication of "thought forms" with regard to the three interdependent pillars of philosophy (epistemological "knowledge forms"), philology (textualised "language forms") and cultural studies ("life forms" as culture-related practices). In a first step, the reconstruction of paradigmatic modes of knowledge representation will be exemplified with regard to the approaches of Aristotelian philosophy, various positions of premodern Indian Buddhism as well as the paradigms of modern science and postclassical physics. In the second step of a cybersemiotic interpretation, Peirce's synechistic understanding of habit will serve us to enlarge the culture-specific notion of life forms as pragmatically grounded thought forms by making it converge with the ethologically informed, biosemiotic notion of "life forms" embraced by cybersemiotics. Exploring cybersemiotics as developed by Brier (2008) from the perspective of Indian Buddhist philosophy intends to work out the phenomenological purport of Peirce's approach, with its move of locating agency in the process of semiosis, by comparing it to the Buddhist

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psycho-ontological view of agency expressed in the fundamental principle of "dependent arising" (*pratītyasamutpāda*). In view of such synergies, we can bring the cybersemiotic interest in the unfolding of knowledge "from our bio-psycho-socio-linguistic conscious being" (Brier 2008) to bear upon the Buddhist notion of "no self" (*anātman/ anattā*). Thus, Kant's transcendental subject, whose unity of apperception was dynamised by Peirce's semiotic transformation of the categories, can now "go intercultural" by further desubstantialising signification in terms of a Buddhist cybersemiotics. Such a deconstruction of the supposed stability of "objects" and "concepts" as exemplified by the substance-philosophical belief in an ontological priority of "objects" will be accomplished in view of 1. the Buddhist explanation of unitary, stable objects existing "in name only" (*prajñaptisat*) with regard to "apperception" (*saṁjñā*) and the famous criticism of "conceptual construction" (*kalpanā*) by the epistemologist Dignāga (ca. 480–540) and 2. the cybersemiotic view of "objects and concepts as cognitive invariants" (Brier 2008) inspired by von Foerster's second-order cybernetics and the creation of self-organised *Umwelten* (in the sense of Uexküll).

Keywords Indian Buddhist philosophy · Transdisciplinarity · Intercultural philology · Peircean process philosophy · Aristotelian ontology · Vasubandhu's *Abhidharmakośabhāṣyam* ("Treasury of Abhidharma") · Dignāga's theory of knowledge · Ernst Cassirer · Knowledge forms · Semiosic agency · Uexküllian biosemiotics · Quantum theoretical objectivity

13.1 Introduction

Taking faith in the synergistic potential of Peircean semiotics, this chapter suggests to explore the depths of a cybersemiotic leap into Indian Buddhist philosophy and philology. Such an interpretation goes decidedly beyond the analysis of an external survey: it is "a commitment at risk", as George Steiner (1989) makes us understand the purport of interpretation. Since theoretical choices and scholarly practice betray cognitive habits and existential attitudes, a Buddhist reading of semiotics is not merely an intellectual exercise. In the present chapter, a deeply felt affinity with the soteriological aim of Buddhist philosophy is going to provide the explicit metaphysics of an interpretive "leap into emptiness": what it implies and presupposes is an existential grounding of semiotics (Tarasti 2000; Brier 2017a, b, c). Cognitive habits and existential attitudes may thus be taken as instantiations of pragmatically grounded thought forms. Against such a background understanding, the aim is to set out the basic coordinates of a cybersemiotic philology of Buddhist knowledge forms for the sake of defining and *re*fining a universal concept of information (Brier 2017d) in intercultural terms. The central notion of thought forms possesses epistemological relevance in the sense that pragmatic ways of modelling the world through processes of cognition and perception endow us with knowledge forms for grounding experience. The reconstruction of thought forms as (ontological) "forms of being", as (epistemological) "forms of knowledge", and as (grammatical or linguistic) "language forms" reflects the classical philosophical interest in the three dimensions of reality, thought, and language, but at the same time goes beyond a purely theoretical conception through the pragmatic grounding of human experience in "forms of life".

This reconstruction of paradigmatic modes of knowledge representation has been developed with regard to philosophical categories: i.e. *kategoríai* (*κατηγορίαι*), which in ancient Greek are (literally) "forms of predication" and by Aristotle (384-322) have been conceived as being parallel to the forms of being and thinking (cf. Oehler 1984), 37ff; p. 163; p. 203; cf. a. Oehler 1987), implying a downright symmetry between *kósmos* and *lógos* (cf. Köller 1988, p. 213). However, we need not confine ourselves to the Western intellectual tradition when looking for an in-depth account of "being and what there is".[1] Because philosophical conceptions of categories touch upon the close intertwining between ontological, logical, epistemological (as well as grammatical) dimensions, according to the transdisciplinary and intercultural approach of a semiotic philology of thought forms, categories are taken as a key to unravelling the specific model of thought forms at stake, including notions of essence and substance. At a yet more fundamental level, language is crucial to the constitution of knowledge and the experience of phenomena through processes of linguistic-conceptual construction and interpretation.[2] In the Western

[1] In his appraisal of *Classical Vaiśeṣika* [i.e. Indian "natural philosophy"] *and the history of Indian ontology* of 1992, the well-known philosopher, indologist and cross-cultural theorist Wilhelm Halbfass contextualises his study of the Vaiśeṣika categories with a look at "the question of being" in India, which is preceded by more general historical perspectives on the matter. Thus, in the introduction we are offered a historical reconstruction of how Aritotle's comprehensive "science" of "first philosophy" (*πρώτη φιλοσοφία*/ *prṓtē philosophia*) became known as ontology (cf. the ancient Greek present participle *ὤν*/*ṓn*, gen. *ὄντος*/ *óntos* of "being"), including a look at how Greek ontological concepts came to be inherited and assimilated by different philosophical and religious traditions and languages (Latin, Arabic, and the European vernaculars, notably German), which in turn helped to shape and refine the classical ontological vocabulary.

[2] This is well known fom the pioneering work done on categories and prototypes by Eleanor Rosch as well as by people like George Lakoff (1987) in the field of cognitive semantics, and more recently within the context of cognitive semiotics. In a similar vein, Mark Johnson criticises the classical (Objectivist) view on categorisation according to which "concepts exist by themselves, objectively" (1987, p. xi). By contrast, drawing upon Hilary Putnam's notion that objects and signs alike are internal to such schemes of description as are employed by (a) particular (community of) users (cf. 201ff.), Johnson stresses that the definition and understanding of concepts depends upon their use within the context of particular culture and the frameworks of human experience it provides (cf. pp. xi-xii; cf. a. Rosa 2012). As we are going to see with regard to the triadic conception of thought forms (in the context of Figure 13.3 below), Peirce teaches us that "Concepts are mental habits; habits formed by exercise of the imagination" (MS 318, 1907 = MS [R] 318:44 as qutd. in Bergman and Paavola 2014). I agree with Günter Abel (1992) that what we need is not a *theory* of signs limited to the interests of an individual science, but a comprehensive *philosophy* of signs: for interpretation sets in long before categories are applied to particular phenomena. Interpretation is needed for those very processes of differentiation and segmentation through which categories (like natural kinds) are created in the first place (cf. pp. 171–172). Through the phenomenological grounding of his semiotics, Peirce provides us with such a foundational and comprehensive philosophy of signs.

history of philosophy, where Aristotle clearly provides the model for “categories of thought and categories of language” (Benveniste 1958), categories come as “a list of a priori concepts” that are understood to organise experience. In a similar way, the Buddhist notion of “dharmas” as minimal constituents of phenomenal appearance (Lettner 2021) can be regarded as a mode of unravelling the presupposed philosophical inventory of the world. The discussion of *dharmas* in the canonical Abhidharma texts (i.e. highly systematic expositions of Buddhist philosophy) provide “detailed lists of what there is” in terms of such minimal “elements of existence”, whilst denying reality to composite objects of ordinary experience (Bronkhorst 1996, p. 112). Just as Peirce seeks to provide a “unified theory of all that is” (Sheriff 1994, p. xvi), the *dharma* taxonomy constitutes a “metaphysics of experience” (Ronkin 2018).

Combining such an explication of thought forms and philosophical categories with the perspective of social philosophy, we may say that it is the operational paradigm of a particular culture that provides the concrete context in which categories come to constitute the fundamental cognitive structures of meaning for the apprehension of reality (Rosa 2012). Thus, a particular scientific or socio-cultural paradigm provides a holistic horizon of meaning for the embedment of thought forms in such basic cognitive-categorial structures that in an operational sense determine the constitution of life forms through language, social practices, and cultural goods (pp. 21; 33; 39). This socio-philosophical view of paradigms and life forms can be mapped onto the social, material, and mental dimensions of culture as identified by Posner (1989, 2004) in the context of his semiotic explication of anthropological categories that are pertinent to the description of culture as a sign system (discussed with regard to “the third pillar” of cultural studies in Sect. 13.2 below, see pages 338ff. leading up to Fig. 13.8 and the discussion of Fig. 13.11 on p. 348). At the pragmatic level of discourse (Brown and Yule 1983; Mey 2009; van Dijk 1997), forms of language become palpable through concrete discursive practices as variously mediated textual forms. At a yet more fundamental level of cognition, language enables the realisation of structured contents of representation, as the philosophy of grammar teaches us with regard to such (more or less) abstract forms of expression that in pragmatic, historical, and anthropological terms have survived as effective ways of thinking and speaking (Köller 1988). Through the cognitive and operational order of grammatical rules, language and thought thus inform the conditions of our knowing and speaking also at a theoretical level of description: we cannot simply choose to be “neutral”. However, we can pay attention to the transcendental conditions of the possibility of our knowing the world as described by Kant as well as to the quasi-transcendental conditions of symbolic representation as captured by Wittenstein’s notion of life forms (Glock 2000). Arguably, besides his further development of the Kantian categories, the foundations for life forms have been laid and anticipated by Peirce’s foundational work on pragmati(ci)sm, including the shift from a critique of reason to a critique of signs (Köller 1988, 41ff.). In methodological terms, the idea is therefore to explicitly reflect upon the frameworks adduced for modelling reality as well as to widen our horizon through self-reflexive procedures and an intercultural perspective.

In order to enlarge its semiotic-philological conception, the reconstruction of paradigmatic forms of knowledge representation as exemplified with regard to the classical traditions of India and Europe (to be set out briefly in Sect. 13.3 below) will be further developed along the lines of cybersemiotics, which provides us with a non-dualistic transdisciplinary process philosophy of knowing (see Brier 2018f, p. 1; see also Brier, Ch. 2 in this book). In keeping with the second-order cybernetic insight that relevant distinctions are generated by cognitive systems as part of their particular universe (of discourse), even scientific paradigms constitute "chosen ways of observing" with regard to principally (i.e. logically and mathematically) undecidable questions (Brier 2008, pp. 219–221). Hence, frameworks are decisive for what is accepted as being rational. Arguably, only a thoroughly intercultural explication of reason, language, logic, and consciousness can help us to "[c]onceptually [...] blow open what cannot be absorbed by concepts" – to put it in Adorno's terms (cf. Adorno 2000). It is the declared aim of cybersemiotics to supplement informational-cybernetic-systemic explanations of life, cognition and communication with phenomenological and hermeneutical approaches of the humanities (Brier 2016). If we want to access those different conceptual worlds, we are going to need a common (scientific) "language": or rather, we need to play language games that also take into account the highly developed "inner world description" of the Eastern traditions (Brier 2008, pp. 111–112). The "phenomenology" of Buddhist (Yogācāra) philosophy is a case in point, not least with regard to its handling of epistemological issues. As is common within the Indian tradition of philosophy, Buddhist thinkers assign primary significance to "epistemology" (*pramāṇa-śāstra*), and "only once they have satisfactorily established the criteria for valid means of knowledge can they move on to making ontological, metaphysical or ethical claims" (Lusthaus 2002, p. 6). In fact, such an approach reveals deep commonalities in spirit with Peirce's understanding of philosophy (Lettner 2020). According to Peirce, any specific theories and scientific knowledge claims can only be fully understood once we have accomplished an investigation into the "general structure of experience" through phenomenological analysis, and on this basis have constructed a "general theory of all forms of representation" (Pape 1998, p. 2019).

Since the aim of cybersemiotics is to achieve an enlarged understanding of information and knowledge involved in cognition and communication (Brier 2017d), we need not only broaden the array of theoretical discourses considered, but also "impregnate" (semiotic) methodology in intercultural terms.[3] By creating the foundations for a cybersemiotic philology of Buddhist knowledge forms, an attempt will

[3] The notion of "impregnating" semiotics with Buddhist conceptions was inspired by Hans Lenk's view on interpretation and his reading of Kant (cf. Lettner 2021). In the present context, such a move is going to be taken by drawing attention to the significance of "dependent arising" (*pratītyasamutpāda*) as an alternative model of causality/ conditionality (including its relevance to a coherent conception of agency) as well as by looking to the notion of *saṁjñā* ("apperception", "conceptual identification") as a concept to learn from in intercultural-semiotic terms. As the third collection of aggregates making up the human empirical person (*pañcaskandha*), (see the explanations provided with regard to Fig. 13.2 as well as Appendix I below), the skandha of "apperception" (*saṁjñā*) denotes "the capacity to comprehend the specific marks (*nimitta*) of phenomenal objects"

be made to develop in more explicit and synergistic terms the process-philosophical dimensions as well as the non-anthropocentric and non-Eurocentric potential of both Buddhism and Peircean semiotics.[4] Such an intercultural and philological enrichment of cybersemiotics needs to be anchored within a global-cultural context of knowledge traditions. Transdisciplinarity is "intrinsically global in character" (Nicolescu 2002, p. 3; see also Nicolescu, Ch. 5 in this book). Expanding the cybersemiotic venture to integrate the study of culture-specific forms of language, thought, and knowledge is thus hoped to work to the benefit of a philologically enriched and interculturally enlarged transdisciplinary cybersemiotics: cybersemiotic philology.

13.2 The Transdisciplinary Model of a Semiotic Philology of Thought Forms

The transdisciplinary model of a semiotic philology of thought forms (Lettner, forthcoming-a) has been developed on the basis of the three interdependent pillars of philosophy, philology and cultural studies, relying upon Peirce's semiotics as the necessary transdisciplinary framework for integrating the various disciplinary domains. For a rough sketch of the relationship between these three broad domains of research see Fig. 13.1 below.

The significance of philosophy to the present model and its investigation of thought forms is closely linked to a broad understanding of semiotics and logic in the tradition of Peirce. In order to develop the micrological interests of philology on a sufficiently comprehensive basis of reflection, philosophy can provide us with the general orientational view for a semiotic consideration of thought forms. Peirce understands "thought [as] always taking place by means of signs" (*CP* 1.444). And as a "generalized logic", Peirce's "general semeiotic" constitutes "the pivot of his philosophical system" (Pape 1990, p. 375). Because the results of phenomenology furnish the "basic principles of semiotics" (loc.cit., p. 376) and evolutionary metaphysics reflects this phenomenological conception of the categories (Esposito 1980), Peircean philosophy presents itself as a "foundational discipline" (Pape 1998, p. 2019). Since a phenomenological analysis of experience usually leads to

(Coseru 2012, *SEP* 2.3) and thus calls for a more detailed comparison to Peirce's notion of the interpretant as the mediating thought that determines the recognition of something as an object.

[4] In addition to Peirce's flexible, process-philosophical methodology, what provides us with a good basis for working out in both systematic and intercultural-philological terms various possible synergies between the Peircean approach and (different traditions of) Buddhism are his own reflections on Eastern mysticism (cf. *CP* 6.102) and Buddhism, i.e. "the Buddhisto-christian religion"(*CP* 1.673) and "the sense of awe with which one regards Gautama Booda" (Peirce 1992, p. 9; cf. a. Brent 1993, p. 260), including the influence of the American Transcendentalists, notably Ralph Waldo Emerson (e.g. Bishop 1981; Brier 2014; Brier 2017a, b, c).

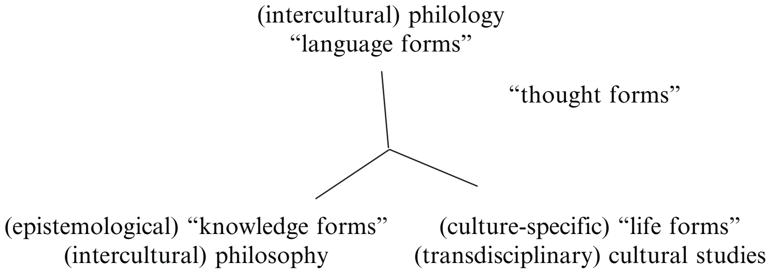

Fig. 13.1 The transdisciplinary model of a semiotic philology of thought forms
Figure 13.1. The transdisciplinary model of a semiotic philology of thought forms rests upon a Peircean-triadic explication of thought forms as forms of representation in the sense of philological (i.e. textualised and variously mediated) "language forms", as epistemological "knowledge forms", and as culture-specific "life forms", which have been reconstructed both in intercultural and in transdisciplinary terms (i.e. on the basis of theories and methods taken from the Indian and the European intellectual traditions) with regard to the triadically interrelated pillars of philology, philosophy, and cultural studies

some form of an ontological "inventory of the world", an investigation and comparison of such ontological models is going to receive significant clues from the philosophical notion of categories. In fact, a conception of categories constitutes something like an inventory of the world in miniature, i.e. a model that is understood to comprise a fundamental classification of all real and possible entities. Now, Peirce provides us with nothing less than a semiotic vision for "a coherent, cosmological/ logical/ moral system" in the sense of "a unified, comprehensive, general theory of everything" (Sheriff 1994, p. xvii); and the Abhidharma Buddhist analysis of existence explains sentient experience with regard to its arising from those discrete and momentary, mental and physical events that are called "dharmas" (cf. Ronkin 2018): i.e. phenomena occurring in the stream of "consciousness" or "cognitive awareness" (*vijñāna*) whose elements designate "both an indivisible unit of experience and an object of conceptual analysis" (Coseru 2012, *SEP* no. 3.1; cf. Lettner 2021).

When dealing with *dharmas* as entities of both experiential presence and conceptual representation we can notice a certain similarity to the way in which phaneroscopy deals with the direct awareness of Peirce's "phaneron" (or "phenomenon"): as the prominent Peirce scholar André De Tienne (1999) tells us, observing a "lived phaneron" needs to be distinguished from the phenomenologist's descriptive, externalising and thus objectifying consideration of what thereby comes to be represented as an "objectified phaneron" (p. 423): a distinction that would be most interesting to consider in light of the methodological dualism between 'thought as object' and 'object of thought' with regard to the Buddhist notion of *dharmas* (cf. Piatigorsky 1984, 172ff.): as discrete and momentary flashings of consciousness (and of "external reality") they could in fact be described as *minimal phaneronic* *events*.[5] Within the context of such classifications, philosophical categories and experiential analyses seek to account for both lawful regularities and spontaneous manifestations at the phenomenological level of appearances. The regularity of *dharmas* is determined by the laws of "dependent arising" or "conditioned origination" (*pratītyasamutpāda*) (cf. Lettner 2020) and stands in no contrast to the impermanence of the *dharmas* and their occurrence "under the proper conditions" (cf. Warder 1971, pp. 284–288) (see the explanations provided with regard to Fig. 13.12 as well as Appendix II below). As the "heart of the Peircean phenomenology", the categories are basic to Peirce's theory of signs, which he develops as "a theory of experience, a theory of consciousness" (Zeman 1977, , pp. 241–242). Thus, Peirce's universal theory of representation builds upon phenomenological foundations in the sense that the semiotic principles of speculative grammar are derived from the order of the three universal categories of firstness, secondness, and thirdness (cf. Pape 1990, 376–377). Taking a brief look at Peirce's phaneroscopy (De Tienne 1999), we can say that certain qualitative possibilities (or "firsts") are anchored in an original undetermined potentiality (of firstness) whilst "awaiting actualisation"; and it is in fact "the phaneron in its firstness" that serves as "the substratum of the phaneron in its secondness" (secondness being the category of actuality), which in turn allows us to explain the passage from *phaneronic presentation* to a *sign representation* by means of a habit-taking process of generality (or thirdness): De Tienne (1999) sets out in detail how such a transformation (or growth) of thirdness "is in accordance with the logic of the categories" (pp. 426–430). In more detailed comparative studies one would need to work out the phaneroscopic and semiotic purport of a whole range of richly nuanced Buddhist conceptions pertaining to the phenomenology of consciousness and the epistemology of perception.[6]

[5] Indeed, seeking assistance from Lusthaus's "translation" of (Yogācāra) Buddhist philosophy into the "target idiom" of Western phenomenology (2002), a more in-depth Peircean exploration of Buddhist epistemological and phenomenological accounts of cognition and perception could best be developed from a close reading of Buddhist key terms in light of the categorial links between phaneroscopy and semiotics (cf. De Tienne 1999, 2013; Ransdell 2017). The fact that with Peirce the phaneron taken in itself can be contrasted with the *phaneron in its secondness* (which can be read as a rudimentary sign definition that makes *phanera* objects of semiotics) (De Tienne 1999, p. 421) can be used for exploring possible overlaps and differences between *phanera* and *dharmas*: not least because "the term *dharma* signifies both any category that represents a type of occurrence as well as any of its particular tokens or instances" (Ronkin 2018, *SEP* no. 2).

[6] Peirce's theory of perception explains how – helped by the continuity and generality of the mind – in perception we pass from the firstness of the phaneron and the secondness re/action of "percepts" to the generalised image of the "perceptual fact" (De Tienne 1999, pp. 425–426). In light of this, phaneroscopy promises to reveal some interesting insights when considering such Buddhist conceptions (and questions) as (the phaneronic nature of) *dharmas* (and their definition as "'upholding,' [namely] upholding intrinsic nature (*svabhāva*)" cf. Ronkin 2018, no. 4; cf. *AKBh* 1988, p. 57); "apperception" (*saṁjñā*) (see Lettner (2020) and Sect. 13.7 below); the notion that a true "presentation" (*ābhāsa*, "appearance") results from the cognition assuming the "form" (*ākāra*) of its object (cf. Dignāga trans. Hattori 1968, p. 29; pp. 105–106); *viṣaya* as the "object" of the sensory faculties (see note 44 and Appendix IIon the *āyatanas*) vs. *ālambana* as the "object-support" or "object of cognition" (*ālambana*) (cf. Dignāga 1968, p. 89; cf. Hattori 1988, 27ff.); the notion of entities existing "in name only" (*prajñaptisat*), cf. Lettner (2020) and Sect. 13.33 below; the different epistemological positions taken by Indian Buddhist schools (incl. Dignāga and the funda-

As phenomenological elements, the categories describe "degrees of external complexity or of dimensionality for representation", but at the level of semiotics they function as internal properties that contribute to the constitution of sign classes (Pape 1990, p. 379)[7]. In fact, Peirce's definition of the sign and its interpretive process of signtranslation (cf. Liszka 1996, 24ff.) called "semiosis" (*semeiosis*) (cf. *EP* 2, p. 411, see note 20 below) involves a triadic relation between a *representamen*, an *object* and an *interpretant*. More precisely, a sign or *representamen* acts as a "first" in a triadic relation representing a "second", i.e. its object, where the *immediate object* ("as represented in the sign", *CP* 8.314) is determined by the constraint that the *dynamic object* offers (cf. Liszka 1996, pp. 21–23). However, not only must a sign "be compelled by its object" (*EP* 2, p. 380), but in order for representation to take place, there needs to be a "third" or *interpretant* for establishing a correlation between the sign (or representamen) and its interpretant, the latter being "determined by the object through the mediation of the sign" (cf. MS 318 as quoted in Liszka 1996, p. 23).[8] In dependence upon the phenomenological categories[9], Peirce's three trichotomies provide the basis for his famous system of ten classes of signs (as developed as part of his 1903 Syllabus, cf. *EP* 2, pp. 289–299; *CP* 2.233–277). They can be visualised as follows (see Fig. 13.2 below). As

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mental distinction between *sva-lakṣaṇa*/ "particulars" and *sāmānya-lakṣaṇa*/ "universals"), see Fig. 13.7 (and Sect. 13.3) below. For a discussion of *dharmas* and/ or *svalakṣaṇ as* with regard to the qualia, sense data etc. of Western approaches see Gudmunsen (1977) on Bertrand Russell's (early) epistemology of logical atomism and Lysenko (2017) on contemporary theories of consciousness (2017).

[7] The categories are interdependent in the sense that "Firstness (Quality) can be prescinded from Secondness (Experience) and Thirdness (Thought)" (Ormiston 1977, p. 221). Because in phenomenological terms, "every triadic element involves dyadic and monadic ones", n-adic elements are reducible (Pape 1999, p. 377) to the effect that in semiotic terms each sign division with the higher phenomenological status also includes the lower one(s): "a legisign always involves a sinsign (and so indirectly a qualisign)" (Liszka 1996, p. 46; cf. *CP* 2.246) (as set out with regard to Fig. 13.7 below).

[8] In order to give an example with regard to Peirce's "three-way" division of *interpretants* (CP 8.314): the *immediate interpretant* is all that e.g. a question about the day's weather "immediately expresses"; the "actual effect" of somebody answering the question would then be called the *dynamical interpretant*, while the *final interpretant* will capture the effect that the answer is going to have: such as disappointment about a stormy day and resulting plans about what to do under such weather conditions. As for the object, Peirce contrasts "the notion of the present wheather" (*immediate object*) with "the actual or Real meteorological conditions at the moment" (*dynamical object*).

[9] Phaneroscopy provides the basis for semiotic relations. In order to understand how the immediacy of *phanera as encountered in direct awareness* is related to *phanera as incorporated into representation* by means of signs, let us take a look at the *qualisign*, which is how Peirce has captured and formalised in semiotic terms the categorial modality of firstness, i.e. of what is no more than "a positive qualitative possibility" (*CP* 1.536). (For its place in the context of the trichotomies, see Fig. 13.2 below). As "the mere quality of an appearance" (Peirce to Lady Welby, cf. Lieb 1953, p. 12), a *qualisign* is at best "a possibility of similarity" (A. De Tienne, personal communication, Jan 20, 2021). In light of its fleeting nature, an as yet unembodied *qualisign* seems to describe the same sort of vague "possibility" as a *phaneron taken in itself*; and just as "[a] quality is something capable of being completely embodied" (*CP* 1.536) and thereby able to "act as a sign" (*CP* 2.244; on the notion of embodiment see note 13 below), the isolation of a *phaneron* from the continuous stream of manifestation boils down to its objectification and representation, thereby leading onto semiotics "as the science that treats of phanera in their secondness" (De Tienne 1999, p. 421; 423).

Phenomenological or formal categories		Ontological or material categories		
		Firstness	Secondness	Thirdness
Firstness	A sign is:	a “mere quality” QUALISIGN	an “actual existent” SINSIGN	a “general law” LEGISIGN
Secondness	A sign *relates* to its object in having:	“some character in itself” ICON	“some existential relation to that object” INDEX	“some relation to the interpretant” SYMBOL
Thirdness	A sign interpretant *represents* it (sign) as a sign of:	“possibility” RHEME	“fact” DICENT SIGN	“reason” ARGUMENT

Fig. 13.2 Peirce’s classification of signs into three trichotomies
Peirce’s classification of signs into three trichotomies (cf. Nöth 1990, p. 44; Fig. 13.2 repr. from Sheriff 1994, p. 41) is the result of combining the three formal sign correlates with the three universal categories of Firstness, Secondness, and Thirdness. We can understand the categories as *ontological modes of being* as indicated by the three horizontal columns (*possibility*, *fact*, and *law/reason*) and as (phenomenological) *modes experienced in consciousness* (*feelings*, *reaction-sensations*, and *general conceptions*)” (loc. cit. p. 40). The three formal sign correlates reflect the perceivable appearance of the *representamen*, the (factual) other-directedness of the *object*, and the (mediating) generality of the *interpretant*. In keeping with Peirce’s famous definition of a sign (cf. *CP* 2.274), the diagramme shows us how the process of semiosis involves a triadic relation between a *representamen*, an *object* and an *interpretant*. The first (horizontal) set of three terms concerns the *representamen*, giving us the three categorial ways in which “the aspect of sign qua sign” can be realised with regard to its *presentative characteristics* or *grounding* (cf. Liszka 1996, pp. 20–21; 35–36). As Peirce explains to Lady Welby (in his letter of 12 October 1904, cf. Lieb 1953, p. 12), when being “the mere quality of an appearance”, a representamen is classified as a *qualisign*; when it is embodied as “an individual object or event”, this makes it a *sinsign* (or token); when “it is of the nature of a general type”, we call it a *legisign* (or type). The second trichotomy (*CP* 2.247) concerns the *representative character* of a sign, i.e. how it functions as a representation of its *object*, which the representamen can again do in three categorial ways (cf. Liszka 1996, p. 37): as an *icon* it shares certain qualities with its object “by virtue of its own internal nature” (Firstness); as an *index* its stands “in a real relation” to the object by means of (spatial or temporal) contiguity (Secondness); and as a *symbol* it represents its object “only in the sense that it will be so interpreted” on the basis of some habitual or lawlike relation (Thirdness) (direct quotations are from Peirce’s Welby letter as quoted above). The third trichotomy concerns the *interpretive* character of a sign’s relation to its *interpretant* (cf. Liszka 1996, 40ff.), whose three categorial types correspond “to the old division, Term, Proposition, and Argument, modified so as to be applicable to signs generally” (*CP* 8.337): in other words, a (vaguely referring) term gives us a *rheme*, whose incorporation (alongside other rhemes) into a proposition gives us a *dicent*, just as a higher-order combination of dicents gives us (one of the three types of) an *argument* (i.e. abduction, deduction or induction). For a brief look at the notion of materiality see note 12 below

phenomenological elements, the categories describe "degrees of external complexity or of dimensionality for representation", but at the level of semiotics they function as internal properties that contribute to the constitution of sign classes (Pape 1990, p. 379). Peirce's affirmation of "pragmaticism as a theory of thought-signs" as accomplished in "A survey of Pragmatism" (ca. 1906, cf. Hausman 1993, p. 58) with regard to "the view that every thought is a sign" (*CP* 5.470) (see note 14 below) can serve us as a basis for a semiotic reconstruction of thought forms as paradigmatic modes of knowledge representation as well as for explaining their pragmatic grounding[10] in life forms, which can be seen to take place through the thirdness of mediation as explained by Peirce's concept of habit. The specificity of Peirce's approach with which he seeks to go beyond the categories assumed by Kant is due to the fact that "he goes directly to the appearances themselves" (Rosensohn 1974, p. 41). This is going to provide us with a point of departure for modelling thought forms on the basis of semiotic grammar.

According to Peirce's understanding, "it is the task of philosophy to develop a grammatica speculativa, i.e., semiotics, which can describe the forms of all types of representation and knowledge" (Pape 1998, p. 2019).[11] In this respect Peirce's thought reflects an engagement with medieval philosophy and scholastic logic, notably the grammatica speculativa of Thomas of Erfurt (Oehler 1987). Peirce can be seen to have transformed Kant's epistemological approach into the semiotic question: "How is representation possible?" (Pape 1998, p. 2018). As a result, his transformation of

[10] While most researchers in the humanities and cultural studies may be more familiar with the classification of syntactics, semantics, and pragmatics as provided by Charles W. Morris in his *Foundations of the theory of signs* (1938), pragmatics as well as this famous division of scientific branches goes back to Peirce's conception of three subdisciplines of "semeiotic" (in its broad sense) as logic (i.e. "the science of the general laws of signs"): 1. speculative grammar (i.e. semiotics in a narrow sense), 2. critic or critical logic (or logic proper as the logic of abduction, induction, and deduction concerned with the conditions of truth), and 3. speculative/ universal rhetoric or methodeutic (*CP* 1.191; *CP* 2.93), which concerns some of the topics that nowadays tend to be treated in the philosophy of science (Pape 1998, p. 2020). Peirce's focus on the sign's grammar, logic, and rhetoric (Liszka 1996, 9ff.) parallels the artes liberales of the medieval trivium: *grammatica*, *dialectica* and *rhetorica* (cf. Oehler 1987, p. 11). Peirce was inspired by Kant's transcendental logic as well as by the scholastic logicians (Michael 1977). In the context of Morris's behaviouristically oriented division of research areas, the abstraction of dyadic relations led to a certain independence of the semantic, syntactic, and pragmatic dimensions; by contrast, what we see in Peirce is an emphasis on the irreducibly triadic nature of semiosis and of the relations it involves (cf. Schlieben-Lange 1979, 26ff. cf. note 20; see also the brief discussion of Peirce's three semiotic disciplines with regard to Fig. 13.8 below), the semantic, syntactic, and pragmatic relations stand in a fundamentally triadic relation according to Peirce.

[11] Considering that Peirce understands his categories as principles for ordering all types of knowledge and representations as they are dealt with in the humanities and sciences (Pape 1990, p. 376), a semiotic reconstruction of thought forms can be developed with regard to Peirce's understanding of the sign "as a phenomenon of thirdness" (Nöth 1990, p. 42). In other words, it makes sense to model thought forms along semiotic lines precisely because "for Peirce, Thirdness–thought, mediation, representation is marked by triadicness" (Ormiston 1977, p. 222). Thanks to Peirce's broad conception of consciousness, which includes the assumption of a deep affinity between "human thought" and "the modes of action of the universe" (*CP* 1.351), we will be able to deal with thought forms (that are pragmatically grounded as life forms) in a transdisciplinary manner by means of a more comprehensive model of natural and cultural life forms (see Sect. 13.7 below).

Kant opens up a way of bringing into view forms of thought as forms of representation, including the benefits of an approach that operates with the concept of semiosis that locates agency in the sign process rather than in an assumption of transcendental subjectivity. What this means in terms of logic is that symbols come into view as "possible objects of thought" (Michael 1978, p. 179) and "logic investigates the forms of thoughts insofar as thoughts are themselves signs" (p. 182). Peirce's semiotic grammar, with its description of the formal features of signs, may thus serve us as a basis for modelling thought forms in semiotically triadic terms (see Fig. 13.3 below).

The triadic conception of thought forms also follows Peirce's decision to use the term "sign" both in a broad sense (referring to the complete triad) and in a narrow

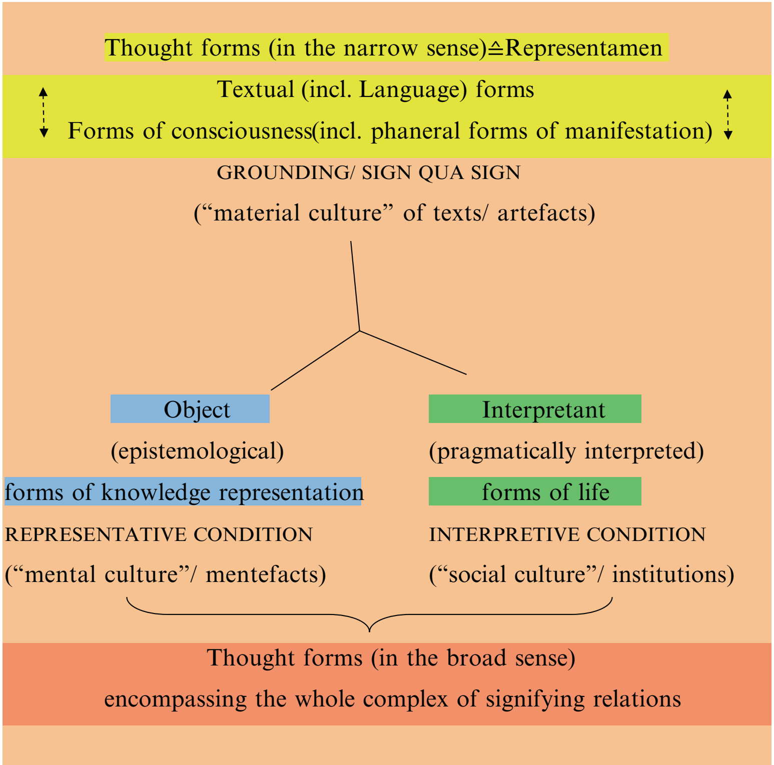

Fig. 13.3 The triadic conception of "thought forms"
Figure 13.3 In analogy to Peirce's triadic conception of the sign, "thought forms" (in the narrow sense) refer only to the "firstness" of (1) the representamen, including the "material culture" of variously mediated textual forms (see note 12). In a broad sense, the notion of "thought forms" refers to all three correlates, including (2) the object dimension (i.e. epistemological forms of knowledge representation), and (3) the social and pragmatic interpretation of thought forms as life forms. The re/presentational dimension of "thought forms" can be seen to encompass the whole spectrum from possible to habitual appearances, ranging from the "firstness" of vague thoughts or sense impressions ("forms of consciousness"), i.e. the fleeting (and phaneral) manifestations of qualisigns, to the "thirdness" of semiotic representations as in the case of canonical texts and their embedment in hermeneutic traditions

sense (referring to the first correlate only) (Nöth 1990, p. 42), for which Peirce however uses different terms like "representamen", "ground", or "representation" (Liszka 1996, 110ff.). Just as a sign may refer to all the correlates together, the notion of "thought forms" (in the broad sense) encompasses the whole complex of signifying relations, including 1. the qualitative characteristics of the sign in terms of its grounding or "firstness" (including the "material" dimension of variously mediated textual forms or artefacts as explained below with regard to the notion of culture as a sign system), 2. its directedness towards an object through an iconic, indexical, or symbolic relation: here the "mental" dimension of epistemological "knowledge forms" includes codes as pairs of signifiers (sound-images) and signifieds (concepts);[12] in the context of a triadic model, mediation is effected through the interpretant, i.e. through 3. the sign's determination of an interpretant, thereby creating pragmatic habits of interpreting "something as something": i.e. the social and pragmatic interpretation of "thought forms" as "forms of life". Against this background, the task to be solved now is: how can thought forms be reconstructed in semiotic terms and then be integrated synergistically with cybersemiotics for establishing a cybersemiotic philology of (Buddhist) knowledge forms? In other words, how are we going to bring together the notions of thought, signs, objects, and concepts in a comprehensive way? The answer is going to be provided by *modelling thought forms as paradigmatic modes of knowledge representation*.

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[12] Cf. Posner (2004, p. 16) and Nöth (1990, p. 60) on (what by his followers has been worked out as) Saussure's mentalistic conception. The above-mentioned social, material, and mental dimensions of culture refer to Posner's (1989, 2004) semiotic explication of anthropology in terms of sign users, artefacts/ texts, and codes as discussed with regard to Fig. 13.8 below. Reconstructing the subject matter of anthropology in semiotic terms as suggested by Posner allows us to consider materiality as a domain that is central to the constitution of culture, see pages 338ff. as well as the discussion of Fig. 13.11 on p. 348). Taking into account the "material" dimension of thought forms (practices of material inscription, various modes of technological mediality and cognitive embodiment) is meant to bring into view the "materialities of communication" (*Materialität der Kommunikation*: German sg.) as theorised by Gumbrecht and Pfeiffer (1988, engl. ed. 1994). In keeping with Sheriff's (1994) distinction between the "phenomenological or formal categories" of a sign (*representamen, object, interpretant*) and the "ontological or material categories" of Firstness, Secondness, and Thirdness", his discussion of Peirce's Welby letter (see the caption to Fig. 13.2 above) makes reference to the "material aspects" of Firstness and Secondness (which are said to be "predominant" in the former) (cf. pp. 41–42). The implied equivalence between the terms "material" and "ontological" is easily given to misunderstanding not least because the "material" nature of a qualisign "happens to be immaterial as far as its modality of being is concerned" (A. De Tienne, personal communication, Jan 20, 2021). However, in order to explore the "materialities of communication" in light of Buddhist phenomenology and theories of (immediate) perception, the notion of Firstness as "the immediate nonconceptual given of sense experience" (Sheriff 1994, p. 42) seems apt to capture the "qualities" that come (not as properties of a substance, but) as "sensorial textures" in the case of Buddhist *rūpa* ("form", "matter") (see the discussion with regard to Fig. 13.12 below), which as "sensorial materiality" (cf. Lusthaus 2002, p. 46) invites comparison to Husserl's hyle as "the raw sensate appearance that impinges on our awareness" (loc.cit. p. 15) and to Merleau-Ponty's non-substantial notion of "flesh" (cf. Lettner forthcoming-e).

For Peirce, "signs are connected with logic because signs are the vehicles for thought as the articulation of logical forms"[13] (Lechte 2008, p. 171). In keeping with "the proposition that every thought is a sign [...] every thought must address itself to some other, must determine some other" (*CP* 5.253),[14] semiotics can serve us to reconstruct "thought forms" as paradigmatic forms of representation – more precisely, as forms of *knowledge representation* that are paradigmatic in the sense of such classical approaches as Aristotelian, Buddhist, or modern scientific knowledge forms (to be set out briefly in Sect. 13.3 below). On the basis of this working definition, *thought forms* can be investigated as culturally specific (and relatively coherent, habitual) ways of modelling the world in terms of objects and concepts. (On processes, see Fig. 13.8 and the discussion of agency starting from Sect. 13.4 below). In Peircean terms, the phenomenological (or "phaneroscopic") categories of firstness, secondness, and thirdness constitute "principles for the ordering of all types of knowledge, and representation in general" (Pape 1990, p. 376). Representation requires both the mediation of grounding and interpretation: as the "presentation of the object", the *ground* serves as the characterizing basis upon which "the sign can represent its object" through the correlation established by the *interpretant* (cf. Liszka 1996, pp. 20–22; 117). Thus, the interpretant as the "mental effect" or idea produced in the mind is also a representation: it is a "mediating representation" (W 2:53–54, cf. Bergman and Paavola 2014). Summing up the workings of representation with regard to Peirce's triadic conception of the sign, representation as "that character of a thing by virtue of which [...] it may stand in the place of another thing" gives us the three well-known correlates of the "*representamen*, the mental effect, or thought, its *interpretant*, the thing for which it stands, its *object*" (*CP* 1.564). In order to now understand how the notion of "knowledge" relates to objects and concepts, let us take a look at the sign definition that Peirce offers in "Of reasoning in general" (ca. 1895): "A *sign* is a thing which serves to

[13] Though Peirce rejects a psychologistic interpretation of logic (cf. Esposito 1980, 85ff.) – and he does so already in his early manuscripts, understanding logic as "the analysis of forms, not [as] a study of the mind " (MS 350), his use of psychological terminology like "thoughts" and his definition of logic reflect the influence of Kant (Michael 1978, p. 182).

[14] While Peirce's "thought–sign equation" does not imply that all signs are thoughts, signs as "generals" "have their functions in nature, or in what thought is about" (Hausman 1993, p. 59). According to Peirce's conception, cognition boils down to a "flow of signs", but this "does not mean that all signs are thought signs" (Borges 2014, pp. 2–3; cf. Hausman 1993, 59ff.). As Michael (1978) explains with regard to "Peirce's adaptation of Kant's definition of logic" in his early manuscripts, Peircean "logic is concerned with the symbols themselves, with words, propositions, arguments, [...] whether they are actually in a mind or not" (p. 179) (See also note 45 in Sect. 13.5 below.). Accordingly, in MS 318 of 1907 (Prag 11–50, cf. Pape 1990), Peirce states, "If a sign has no interpreter, its interpretant is a 'would be', i.e. is what it would determine in the interpreter if there were one" (Prag 43, p. 392 = *EP* 2, 1998, p. 409; see also Brier, Ch. 2 in this book, p. 21): Peirce's "would be" actually invites comparison with the Abhidharma Buddhist view that even when a *dharma* (e.g. a visual object) is not actually grasped as an object (by the visual consciousness), it is still considered as an object – just as fuel retains its combustible nature even when it is not on fire (*AKBh* II, 62 c, cf. Pruden Vol. 1, p. 302). Following Pape's (1990) edition of this manuscript, Peirce's page numbering has been indicated by "Prag X" and followed by the number of the relevant page in Pape. Cf. ch. 28 "Pragmatism" in *EP* 2, 1998, (pp. 398–433).

convey knowledge of some other thing, which it is said to *stand for* or *represent*. This thing is called the *object* of the sign; the idea in the mind that the sign excites, which is a mental sign of the same object, is called an *interpretant* of the sign" (MS 595, Art. 5 = *EP* 2, p. 13).

What does this tell us about the relation between objects and concepts? The *interpretant* as the idea excited in the mind (of a possible interpreter) acts as a *mental sign of the represented object*. Again, we may be reminded by Peirce that "We think only in signs" and understand that these "mental signs are of mixed nature [i.e. a mixture of *likenesses* (*icons*), *indices*, and *symbols* (habits)]: the symbol-parts of them are called concepts" (MS 404, ca. 1894 = *EP* 2, p. 10). As a mediating representation for a sign, an interpretant acts as a mental sign of the represented object, which is represented by a concept to the extent that concepts denote the symbolic dimension of mental signs. In other words, "A concept […] is a mental sign" (ca. 1907) and thus an "intermediary" through which the represented object can come to determine the effect that is intended to be awakened by the sign itself (cf. Prag [R]. MS [R] 322 as qutd. in Bergman and Paavola 2014). A summary of the main terms presented so far, including relevant aspects and relations to be discussed on this basis, is given in Fig. 13.4 below.

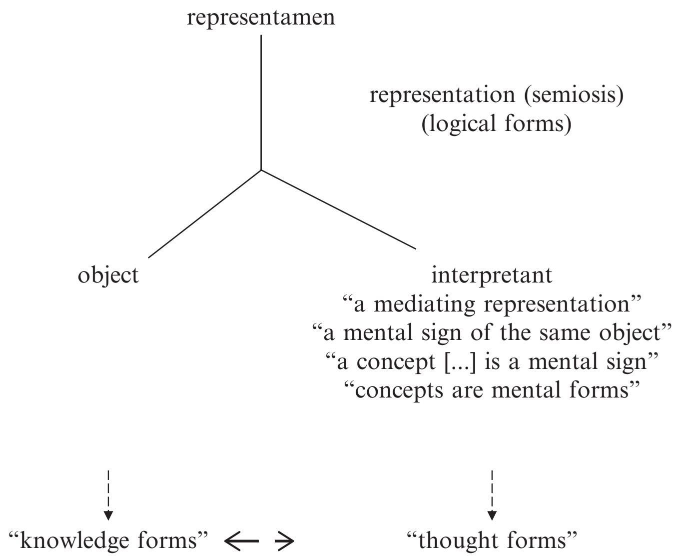

Fig. 13.4 Thought forms as paradigmatic modes of knowledge representation
Figure 13.4. Signs articulate thought by means of "logical forms" in the sense that logic deals with the symbolic aspect of signs, i.e. their logical form. Modelling the world in terms of objects and concepts, thought forms thus represent their object (of knowledge) in some respect (i.e. on the basis of a "ground") through processes of representation (or semiosis); and they do so by means of an interpretant as "a mediating representation" or "a mental sign of the same object". Concepts as "mental forms" are thus necessary for the representation of objects by means of knowledge forms. This means that mental forms are embodied as textually palpable "thought forms" that are at the same time constituted as representational "knowledge forms" in an epistemological sense

We have so far discussed the conception of thought forms with regard to the mediating function of the interpretant for the sake of representation and thirdness. Let us now take a look at how the object dimension is involved in the constitution of (specifically mediated) forms of knowledge representation.[15] "Whatever is objective exists through an actual representation, that is, as cognized or known" (Deely 1990 as qutd. by Brier 2008, p. 269). The fact that knowledge becomes palpable through (our cognition of) objects in the form of actual representations implies that "the *form* that *knowledge* assumes depends on the type of modeling used" (Sebeok and Danesi 2000, p. 8). – Concepts are "mental forms" (ibid.). Thus, what matters to the present question is Peirce's focus on "thoughts as they present themselves in their logical form" (MS 920 as qutd. in Michael 1978, p. 177) as well as the fact that logic deals with "thoughts only in so far as thoughts are viewed as symbols" (p. 180). On this basis, explaining the constitution of "knowledge forms" can be achieved through a semiotic reconstruction of "thought forms": thought (taking place in the form of signs – or rather through a potentially "infinite series" of representations, cf. *CP* 1.339) is actualised through the mediation of mental signs, i.e. concepts, by means of which a representamen "stands to somebody for something in some respect or capacity" (*CP* 2.228): through the specifically mediated form that the particular representation takes, it can thus become the object of knowledge for that particular "somebody": for "a sign is something by knowing which we know something more" (*CP* 8.332). Along Peircean lines, "...all our thought and knowledge is by signs" (ibid): an assumption that will need to be modified with regard to the Buddhist notion of insight (*prajñā*) that goes beyond the level of language and thought and thus also happens without mediation through signs (cf. Lettner 2020). It is with regard to *the pillar of philosophy* that we may develop the notion of *epistemological "knowledge forms"*.

1. As for the pillar of philosophy, the semiotic philology of thought forms proposes to consider the theoretical and historical embedding of texts and other medial products with regard to the classical philosophical traditions they have grown out of, setting out to unravel the logical, ontological, and epistemological assumptions they rely upon, including the role that is assigned to language.[16] Such onto-

[15] "What is so special about the object of the sign? Why not rather concentrate entirely, e.g. on the interpretant?" (Pape 1990, p. 380). Pape reminds us that Peirce is a realist in the medieval sense "because he holds that universals are realized *in re*, that is, they are instantiated in forms that constitute the objects of our knowledge" (ibid.). They are types manifesting by means of tokens.

[16] Language assumes a fundamental significance with regard to philosophical foundations through In view of the epistemological implications of linguistic categorisation (as captured by cognitive semantics) language assumes a fundamental significance with regard to philosophical foundations. More precisely, epistemological significance of language becomes obvious with regard to its fundamental representational function as stressed in the context of universal grammar (cf. Foucault 1971, 118ff.). However, the epistemological purport of a particular language (and worldview) is realised through the use of natural languages. Housing "deeply entrenched *conceptual* languages", natural languages embody "comprehensive structures of cognitive grammar" that make up the acknowledged (cultural) ways in which forms of knowledge are "recognised as knowledge,

logically relevant processes of differentiation that have shaped both the cognitive and operational knowledge accumulated in grammar may be brought into view through the perspective of a philosophy of grammar (Köller 1988): With its pragmatic foundation and semiotic concept of meaning, the latter allows us to investigate such categories as substance, quality, and process as pragmatically successful forms of organising thought and perception with regard to the notion of "cultural forms" (cf. 83ff; 174ff.).[17] In addition to the close connection of semiotics with phenomenology and hermeneutics, its embedding in Peirce's philosophical pragmatism shifts the epistemological focus from a critique of reason to a critique of signs and, in keeping with the pragmatic turn in philosophy and linguistics, allows us to bring into view the social dimensions of sign processes and communication (cf. 41ff.).[18] In order to get a grip on philosophy in concrete methodological terms, the three philosophical dimensions of language, thought, and reality (see Fig. 13.5) are going to be considered with regard to their

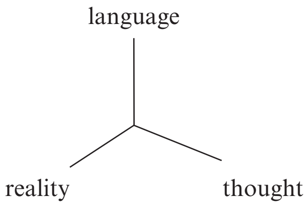

Fig. 13.5 The classical philosophical dimensions of language, thought, and reality
Figure 13.5. The three explanatory dimensions of *language*, *thought*, and *reality*, which we have known as correlates of the semiotic triangle and which can still be sensed in Peirce's triadic conception of semiosis (cf. Fig. 13.6 below) provide us with the philosophical foundations for formulating "thought forms" as "paradigmatic modes of knowledge representation" (cf. Fig. 13.4 above). Thus, "thought forms" (in the narrow sense of the term, cf. Fig. 13.3 above) deal with such entities as (may) become the object of knowledge through the phenomenology of experience. In order to get a grip on the rather general scheme of *language*, *thought*, and *reality* with regard to the constitution of reality, let us look to an explanation provided by Peirce's pragmaticist philosophy. Peirce tells us "that the third category – the category of thought, representation, triadic relation, mediation, genuine thirdness, thirdness as such – is an essential ingredient of reality, yet does not by itself constitute reality" (*CP* 5.436): for in concrete terms it requires action (i.e. Secondness) just as the latter requires "the immediate being of feeling on which to act" (i.e. Firstness). Moreover, "Objects are divided into figments, dreams, etc., on the one hand, and realities on the other" (*CP* 8.12), the real being "that which is not whatever we happen to think it, but is unaffected by what we may think of it"

acquired, deposited, examined, disseminated and continued as intellectual and practical traditions" (Kaviraj 2005, p. 120).

[17] Through its historical-genetic interests in the evolutionary correlation between linguistic and logical structures, the philosophy of grammar analyses such patterns that have stabilised as conventionally and intersubjectively employed instruments of communication (Köller 1988, p. 92).

[18] It is in fact through the pragmatic dimension of linguistics that the concerns of philosophy and linguistic theory overlap also in historical terms (cf. Schlieben-Lange, 1975/ 1979).

transposition onto a signification model with three correlates as captured by the so-called semantic or semiotic triangle (cf. Chriti 2016; Kraus 1990).[19] Such a threefold model for understanding reality goes back to Aristotle, whose conceptions have exerted an enormous influence on the subsequent centuries of Western philosophy, including Peirce's conception of semiosis as being irreducibly triadic[20] (see Figs. 13.5 and 13.6).

Within the Western tradition of philosophy, it was Aristotle (384–322) who for the first time clearly distinguished between the "linguistic" level of signs

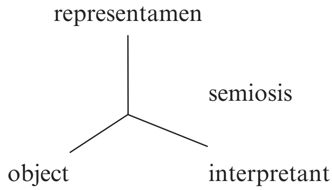

Fig. 13.6 Peirce's triadic conception of semiosis (or representation)
Figure 13.6. Peirce's triadic conception of semiosis in terms of *representamen*, *object* and *interpretant* provides us with a workable basis for modelling philosophical explanations of life in terms of formal semiotics (as set out with regard to Fig. 13.2 above). According to the proposed transdisciplinary model of a "semiotic philology" (set out in Fig. 13.1 above), "thought forms" are investigated with regard to (1) variously mediated "textual forms" as already captured by the classical philosophical dimension of language (cf. Aristotle's *τὰ ἐν τῇ φωνῇ*, i.e. "spoken sounds" or "words", as *σύμβολα*, i.e. "symbols"); (2) epistemologically oriented "knowledge forms", bringing in the object-related dimension of reality (cf. Aristotle's *πράγματα* "things"); and (3) culture-specific "life forms", which reflect the classical philosophical dimension of thought (as in Aristotle's *παθήματα τῆς ψυχῆς*, i.e. "affections of the soul" or "mental entities"). By embodying particular habits of thinking, speaking, and acting, "life forms" naturally bring in the dimension of *reality* as their field of operation and by way of this, the dimension of *thought* is enacted through the culturally mediated, social and pragmatic interpretation of "thought forms" as "life forms" (as summarised in Fig. 13.8 and Fig. 13.9 below). If with Peirce a habit is best described by means of "a description of the kind of action to which it gives rise" (*CP* 5.491), the step from "thought forms" to their pragmatic enactment as "life forms" can be understood in analogy to explaining a concept by means of "a description of the habit which that concept is calculated to produce" (ibid.); to put it in Peircean terms, a particular "life form" thus presents itself as "the living definition, the veritable and final logical interpretant" in pragmatic terms. (A closer look at *life forms as habitual instantiations of pragmatically grounded thought forms* will be offered in the context of discussing *the third pillar of cultural studies* further below in this section)

[19] In the famous passage of *ΠΕΡΙ ΕΡΜΕΝΕΙΑΣ /De interpretatione* (16a, 3–4, trans. Ackrill, cf. Aristotle 1963; cf. the ed. & trans. by Zekl in Aristotle 1998b, pp. 96–97), Aristotle describes "spoken sounds" (*τὰ ἐν τῇ φωνῇ*; "words") as symbols for affections in the soul (*τῶν ἐν τῇ ψυχῇ παθημάτων σύμβολα*) and the latter as "likenesses" (*ὁμοιώματα*) of "things" (*πράγματα*). Thus, Aristotle's model introduces a third correlate as a dimension that mediates between the levels of "language" on the one hand and "facts" of the world on the other hand.

[20] i.e. "semiosis" as "an action, or influence, which is, or involves, a cooperation of *three* subjects, such as a sign, its object, and its interpretant, this tri-relative influence not being in any way resolvable into actions between pairs" (*EP* 2 = 1998, p. 411).

(words, sentences), an epistemological level of cognitive correlates (concepts, propositions), and an ontological level of things (truth values, facts), which was done within the context of logic and the aim of formulating a syllogism (Keller 1995, pp. 36–37). Aristotle's philosophy clearly belongs to the typically Western approach of an "object-ontology", which deals with discrete individual entities ("Einzeldinge"). In fact, substance ontologies that stand in the tradition of Aristotle's distinction between substance and accidents have been contrasted with (more recent Western) approaches of a "process ontology" (cf. Abel 1985). On the other hand, what is central to the no-substance ontology of Buddhism (cf. Bhatt and Mehrotra 2000) are processes, not substances: "The process is the thing" (Hiriyanna 1994, p. 142). While the philosophy of Peirce stands firmly grounded in the history of Western philosophy, reflecting an intense engagement with the thought of milestones like Aristotle and Kant, his approach at the same time constitutes "a true semiotic process philosophy" (Brier 2017a, p. 102), whose fundamental significance has not been fully recognised so far. The present chapter intends to work out its potential for both a dynamic description and an intercultural reconstruction of thought forms with regard to the classical traditions of Greece and India, including the development of Buddhism, which has historically grown out of the Indian philosophical context (cf. e.g. Hutter 2001).

In philosophical terms, the teaching of Buddhism (cf. e.g. Hamilton 2001 for "a very short introduction") stands in stark contrast to the notions of (spiritual) "self" or "soul" (*ātman*) as expounded in the Upaniṣads. With its "denial of the soul as a substantial reality", Buddhism enacts a break with the Upaniṣadic tradition and the "dominant Ātmanism of the period" (Varma 2003, pp. 84–86). The doctrine of no-self (*nairātmya-vāda*) reveals the same insight of impermanence with regard to what in substance ontologies figures as self/ soul and matter, which accounts for the "sameness of the explanation given of both the self and the material world" (Hiriyanna 1994, p. 141). Thus, what makes Buddhists proponents of a "process philosophy" and "negative ontology" are notions of change and impermanence, which point out the "illusory nature of self and substance" already in the earliest canonical documents and are later elaborated more systematically in terms of "momentariness" (*kṣanikatva*) and "voidness" or "emptiness" (*śūnyatā*) (Halbfass 1992, p. 35). Combining philosophical and theological criteria of classification (Bhatt and Mehrotra 2000, p. 4) one arrives at the following schematic overview with regard to the four main schools of Indian Buddhism (see Fig. 13.7).

In terms of ontology, the Vaibhāṣika and Sautrāntika divisions of Buddhism both have a realistic tendency; but even at this early stage of development Buddhist analysis of mind "is no simple empiricism" (cf. Waldron 2003, p. 43). In epistemological terms, the positions of the various approaches can be sketched briefly with regard to an assumption of direct perception (Vaibhāṣika), a representationist theory of object impressions (Sautrāntika), negativistic skeptics (Madhyamaka) and the dependence of objects on the perceiving consciousness ("mere cognition"/ *cittamātra* doctrine of Yogācāra). The Mahāyāna tradition

Lifetime of Gautama Buddha (450-370 B.C.E.) Early Buddhism or “Pāli Buddhism” ←→ “three baskets” (Pā. *tipiṭaka*/ Skt. *tripiṭaka*)				
	ca. 200 B.C.E – 200 C.E. “Abhidharma Buddhism”		from ca. the 1st cent. B.C.E.	
theological classification	Hīnayāna “Little Vehicle”		Mahāyāna “Great Vehicle”	
philosophical classification	Vaibhāṣika, cf. *vibhāṣa* (“commentary”)	Sautrāntika (“those following the sūtras”)	Madhyamaka Nāgārjuna (ca. 150-250)	Yogācāra doctrines from ca. the 2nd cent. C.E.
ontological tendency	pluralistic and realistic		monistic and “idealistic”	
metaphysics	dualism of mental (*citta*) and physical (*bhūta*) elements		*śūnyatā* “emptiness”, “essencelessness”	*cittamātra* “mind-only”, “mere cognition”
perception (of objects)	object-qua-object = direct perception	representationist theory of object impression	empirical vs. transcendental truth; skepticism	no objects of cognition without consciousness

Fig. 13.7 Simplified sketch of Indian Buddhist philosophical schools
Figure 13.7. According to modern scholarship, the lifetime of Gautama Buddha is dated to 450-370 B.C.E. (cf. Oberlies 2000, p. 169). After the first centuries of Early Buddhism or “Pāli Buddhism” (contained in the “three baskets” discussed below), the original community started dividing itself into differents schools (18 according to tradition), whose names indicate characteristic doctrines, geographical places or founding figures: e.g. the Vaibhāṣikas (named after the “Great Commentary”, i.e. Mahāvibhāṣa of the 1st/2nd cent. C.E.) or the Sautrāntikas (cf. sūtra, i.e. “those following the sūtras”) (cf. Conze 1962; Ronkin 2018). These schools usually receive the collective name Hīnayāna (lit. “Little Vehicle”), which is a pejorative term coined by the followers of the later Mahāyāna (lit. “Great Vehicle”) (doctrines arising from ca. the 1st cent. B.C.E.): the proponents of the latter adhere to the Bodhisattva ideal of seeking not only individual liberation, but spiritual welfare for all beings (cf. Hiriyanna 1994, pp. 196–197; Tola and Dragonetti 2004, xiff.). The inclusion of the opinions held by the followers of this “Vehicle of the Disciples” (*Śrāvaka-yāna*) in systematic expositions led to the (so-called “scholastic”) exegetical literature of Abhidharma Buddhism (i.e. “abhi-dharma”, lit. “higher doctrine”), which can be dated to about 200 B.C.E –200 C.E. In addition to the theological classification into Hīnayāna and Mahāyāna, Buddhist thought in India falls into the four philosophical divisions of Vaibhāṣika, Sautrāntika, Madhyamaka and Yogācāra: a particular logical order (reflecting epistemological and ontological positions), which may also be the chronological order (cf. Bhatt and Mehrotra 2000, p. 4)

(that comprises Madhyamaka[21] and Yogācāra) is often described as being "idealistic", though this label is far from being unproblematic.[22] While a proper outline of these positions and their semiotic purport needs to be the subject of a more detailed exposition, the present sketch can serve us as a point of reference for contextualising the position of the first great proponent of the Buddhist logico-epistemological school, Dignāga (ca. 480–540), some of whose theories are going to be discussed (starting from Sect. 13.3) below.[23] The way in which the development of Buddhist theories needs to be contextualised with regard to the various canonical traditions of textual transmission is now going to be explained with regard to *the philological pillar of textualised "language forms"*.

[21] "Mādhyamika" or "Mādhyamikas" (with a final -s for the English plural ending) refers to the proponents of this approach.

[22] For approaches that argue against any (simple) idealist interpretation of Yogācāra cf. e.g. Kochumuttom (1982) and Lusthaus (2002), who provides an in-depth study of Buddhist phenomenology. A good overview of the different positions can be found in Coseru (2012), who discusses the controversy about whether Yogācāra can be interpreted as some form of idealism, while at the same time characterising the Vaibhāṣikas as "Realists" and the Sautrāntikas as "Phenomenalists" (cf. *SEP*, no. 6.4 and 6.5). The view taken by Vasubandhu's *Treasury of Higher Knowledge* and its autocommentary (*Abhidharmakośabhāṣyam*, cf. *AKBh 1988*, see the final note on Abbreviations and Spelling Conventions below) is highly interesting in light of the present focus on the constitution of objects, concepts, and processes: "cognition follows the sense rather than the object", which becomes obvious in the employment of terminology: "thus, a consciousness which accompanies seeing is designated as 'visual consciousness' (*cakṣurvijñāna*) rather than 'consciousness of the visible' (*rūpavijñāna*) (cf. Coseru 2012, no. 4.2).

[23] While for the Vaibhāṣikas and some Mādhyamikas "consciousness is mirror-like in its nature, reflecting an object without being modified by it", the famous epistemologists Dignāga and Dharmakīrti (ca. 600–660) adopt a representationalist stance towards perception: following the Sautrāntika and the Yogācāra positions, the epistemologists maintain that cognition assumes the *"form"* (*ākāra*) of its object (cf. Coseru 2012, *SEP* no. 7.2). According to this position (i.e. *sākāravāda*), the object serves as the ground upon which the cognition is based; only if the cognition is determined by the object to the effect that it possesses its form, it results as a true *"presentation"* (*ābhāsa* [i.e. "appearance", cf. the Greek etymology of phenomenon as "that which appears", annot. by myself]) of that object (cf. Bhatt and Mehrotra 2000, p. 19). Dignāga managed to accomplish a "synthesis of the Sautrāntika and Vijñānavāda [i.e. Yogācāra] schools" (Bhatt and Mehrotra 2000, p. 8). In fact, the "key philosophical issue that is supposed to separate the Sautrāntika and the Yogācāra perspectives is that of whether or not the objects of experience actually exist independently of our awareness of them" (Hayes 1988, pp. 97–98). At the same time, by criticising views of the Sarvāstivādins ("All Exists" School: the Sarvāstivādins of Kashmir are known as Sarvāstivāda-Vaibhāṣika, cf. Ronkin 2018), the Sautrāntikas also provided a bridge to Vijñānavāda philosophy by clarifying "the distinction between conceptual entities and entities existing objectively in the external world" (Hattori 1988, p. 40): where "objective existence" excludes any (macroscopic) objects of conventional appearance as "existing only nominally" (*prajñaptisat*) in the sense of "ordinary reality" (*saṃvṛti-sat*) as opposed to entities of "ultimate reality" (*paramārtha-sat*), i.e. not further analysable minimal things possessing a "single efficacy". "Vijñānavāda" is another term for the *cittamātra* doctrine/ "cognition-only" theory of Yogācāra, which stresses the central significance of "vijñāna", i.e. consciousness – or rather "representations of consciousness", as one might put it with Kochumuttom (1982) in order to avoid any idealistic and reifying assumptions with regard to the function of consciousness. Cf. a. the preceding note.

2. The second pillar of philology further develops Peirce's notion of the representamen with regard to its linguistic and textualised dimensions.[24] From the perspective of the philosophy of grammar (Köller 1988), language constitutes a very specific "object of thought" that can be discussed only at a secondary level of reflection by using the means of language itself (p. 174). In this respect, philology as "the critical self-reflection of language" parallels philosophy, which is "thought critically reflecting upon itself" (Pollock 2009, p. 934): both approaches converge in the business of textual interpretation. At the same time, Hans-Georg Gadamer reminds us that the "love of what is wise" (philosophy) and the "love of the lógoi", i.e. "speech" or "literature" (philology) have typically operated with different notions of "text" (Fehér 2013): traditionally centring on the discussion of authoritative texts, "philology focuses its attention on textuality and the wording of the text", while the main concern of (philosophical) hermeneutics is meaning (pp. 490–491).[25] Following Pollock's understanding of philology as "the discipline of making sense of texts", we may not only go beyond the narrow focus on classical European antiquity and thus do justice to intercultural concerns, but we can also make philological interests converge again with the business of meaning as pursued in hermeneutic philosophy: philology is "a global knowledge practice" (2009, p. 934). As a "joint venture" of philosophical and philological approaches, both of them pragmatically grounded within the larger context of cultural studies, a transdisciplinary philology of thought forms operates with the assumption that textual exegesis constitutes a – if not *the* – paradigmatic form of interpreting signs within the context of cultural studies (cf. Assmann 1997). Thus, the aim of an intercultural-philological explication of reason and philosophical categories is realised through the application of its semiotic-philological model and its programmatic endeavour of tapping into original texts (in Sanskrit, Pāḷi or Tibetan as well as in ancient Greek). The idea of this approach is to develop synergistic explanatory models that integrate conceptual issues and solutions from both the classical Indian/ Buddhist and European intellectual traditions.

   In contrast to the special significance of the Sanskrit language for the orthodox systems of Indian philosophy[26] and its classical thought forms and modes of knowledge representation, Buddhist epistemological ideas did not concern the Sanskrit language in particular, but were formulated in more general terms as "just that, ideas about the relationship between language and reality" (Bronkhorst 1996, p. 111). In fact, the Buddha is reported to have instructed his disciples to give his teaching "in their own dialect" (*sakāya niruttiyā*) (Brough 1980 as qutd.

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[24] While Peirce's representamen is a "first", philosophy (and not philology with its more obvious relevance to linguistic and textual dimensions of appearance) has been introduced as the first pillar in logical terms because the philosophy of signs may provide us with the necessary phenomenological and semiotic basis for discussion.

[25] For a brief discussion of definitions of "text" see note 32 below.

[26] The six orthodox schools of Indian philosophy comprise Sāṁkhya and Yoga, Nyāya and Vaiśeṣika, Mīmāṃsā and Vedānta, all of which (at least nominally) accepted the authority of the Veda.

by Houben 1997, p. 105). As a result, the teachings of the Buddha are known to us on the basis of various "canons of scripture", which are derived from the early Saṅgha's [i.e. (monastic) community's] oral transmission of bodies of teachings agreed on at several councils" (Harvey 2013, p. 3). In view of this, the notion that Buddhism is "an intellectual abstraction" (cf. Gethin 1998, p. 3) needs to be taken seriously in philological terms. This means that Buddhist textualised language forms come to us through various historical traditions, most of which possess their own constitutive textual transmission. The canonical texts of Buddhism are contained in the so-called "three baskets" (Pā. *tipiṭaka*/ Skt. *tripiṭaka*), i.e. 1. the *vinaya* (monastic rules), 2. the *sūtras/ suttas Pā.* or *āgamas*, i.e. the discourses and teachings attributed to the Buddha, and 3. the *abhidharma* or *abhidhamma* (Pā.[27]), i.e. "scholastic" interpretations in the form of highly systematic exegetical literature, which in early accounts are frequently referred to as "Buddhist scholasticism". There are two main schools of Abhidharma with complete textual corpora: i.e. the Theravāda corpus in Pāḷi and the Sarvāstivāda corpus in Sanskrit (cf. Ronkin 2018; Buswell and Jaini 1996). Against this background, let us now turn to develop *the pillar of cultural studies* with regard to the notion of *culture-related "life forms"*.

3. The third pillar of cultural studies is linked to both philosophy and philology through its overlaps with regard to the concerns of hermeneutics and textual reading practices. The shift of attention from supposedly timeless methods towards locally and historically contextualised criticism (Di Leo 2000, pp. 201–202) needs to be considered for doing justice to the way in which *thought forms become palpable as "textual forms", i.e. as specifically medialised instances of text-making constituted within a network of social practices and tied up with culture-specific modes of knowledge production*. This also responds to the need of dealing with the specificity and coherence of a particular culture in terms of intercultural philosophy.[28] What we need is a comprehensive, semiotic definition of culture that can furnish a sufficiently coherent context for describing thought forms as culturally specific and coherent modes of knowledge representation. How is meaning embedded in the structures of a culture in the sense of "thought forms" – and how is it actually *lived*, i.e. enacted and (re)negotiated in the sense of "life forms"? In order to explain the pragmatic grounding of life forms, the attention towards theoretical models and authoritative texts needs to

[27] "Pā." = Pāḷi terminology (please see the final note on abbreviations and spelling conventions). For a "note on Buddhist languages" cf. Gethin (1998). For a detailed discussion of the Buddhist textual tradition see Oberlies (2000); Buswell and Jaini (1996) provide a detailed discussion of relevant literature with regard to the development of Abhidharma philosophy; for summaries and/ or discussions of single texts see the Encyclopedia of Indian philosophies edited by Karl H. Potter (notably vols. 7 and 8; cf. Potter 1996); For a short look at the Buddhist theoretical view on language see the brief outline towards the end of note 40.

[28] Cf. e.g. Franz Martin Wimmer, who within in the context of discussing intercultural philosophy (2003) draws attention to how the specificity of a human "life form" manifests itself through the internal coherence of a given culture in all areas of thinking, feeling and evaluating etc., without assuming culture to be anything like a static or isolated formation (cf. Wimmer 2003, p. 12).

be supplemented by the perspective of social philosophy, according to which human thinking, acting, and speaking is necessarily contextualised through a particular (cultural, scientific etc.) paradigm (cf. Rosa 2012).[29] Applying the findings of social philosophy to the investigation of thought forms (as set out with regard to Fig. 13.4 above), we can say that *knowledge forms are interpreted and enacted as life forms on the basis of thought forms*, whose categorial structures are constituted through holistic horizons of meaning by means of a close connection between both linguistic-conceptual and practical dimensions of knowledge.

In order to define life forms for the purposes of cultural studies, we may rely upon Wittgenstein's notion of life forms[30] and Peirce's semiotic conception of habit, which is characterised as a dynamic relationship between the "phenomenal present" created by semiosis (through its choice among habits) and the sequential behaviours of habits (Kull 2016, p. 625). "Habits are inferences carried out by life far before logic becomes conscious or formal" (ibid.), and "habituation is what structures behavior so that it no longer *is* spontaneous or blind" (Rosensohn 1974, p. 67). On this basis, according to the model of a semiotic philology of thought forms, *life forms are defined as habitual instantiations of pragmatically grounded thought forms, whose categorial and conceptual structures are constituted within the semiotic network of a particular culture, including its anthropological and existential dimensions, through the social, material, and mental practices of knowledge representation*. More precisely, the notion of cultural life forms can be defined on the basis of the cultural-semiotic "assumption that cultural activity is essentially convention-based semiosis, i.e. signification including codes, texts, and sign users", as Roland Posner explains in the context of his semiotic explication of culture (1989, 2004). Let us now take a closer look at this understanding of culture.

As is pertinent to the current interest in textualised meaning forms and life forms, we will follow Jurij Lotman's conception of the "semiosphere" (2005), which he develops from the notion that the "semiotic universe may be regarded as the totality of individual texts and isolated languages as they relate to each other" (p. 208). Thus, rather than to construct the semiosphere "out of individual bricks", primacy lies in the "greater system" of the semiosphere as "a unified mechanism (if not organism)" and "semiotic space, outside of which semiosis itself cannot exist" (ibid.).[31] In this sense we are going to define culture as a sys-

[29] As suggested by Charles Taylor's theories and Thomas Kuhn's "lexicon structure", social paradigms or forms of life (in the sense of Wittgenstein) are constituted through intersubjectively embedded and materialised practices of self-interpretation that define options for identity and action through language, self-concepts, values and socially acceptable practices (cf. Rosa 2012, 31ff.).

[30] According to Wittgenstein's notion of "life form", not only does language require the context of practice, but understanding grammar as an integral part of human practice in turn serves to detranscendentalise this very opposition (cf. Glock 2000, p. 201).

[31] The usefulness of this approach will become obvious in the discussion below with regard to Buddhist explanations of the psychic and cosmic universe in terms of "dependent arising"

tem of sign systems. What we need is a dynamic and comprehensive notion of culture that explains how texts are part of this whole and that at the same time operates with a sufficiently broad definition of text.[32] At the same time, however, we need to go beyond the "claim that culture is nothing but a set of texts" (cf. Posner 1989, p. 261): a notion fit to capture only "civilisation" in the sense of "material culture" (i.e. artefacts, texts etc.). Besides this, we also need to take into account the mental and the social dimensions of culture – and do so in a way that allows us to systematically relate the various dimensions to each other. We may do so on the basis of an approach that has been developed by Roland Posner through a semiotic explication of anthropological concepts with the aim of setting out "What is culture" (1989). More precisely, by defining a society "as (a set of) sign users, a civilization as (a set of) texts, and a mentality as (a set of) conventional codes", the subject areas of social anthropology, material anthropology, and cultural anthropology can be shown to be related as systematically connected domains: for "*sign users* are dependent on *codes* if they want to understand *texts*" (2004, p. 16, my italics) (see Fig. 13.8).

In keeping with Peirce's philosophical framework for transdisciplinarity, the semiotic-philological reconstruction of "thought forms" (including *textual forms*, *knowledge forms* and *life forms*) relies upon (intercultural) philosophy, (a global-historical) philology, and an approach of cultural studies that sees cultural semiotics embedded in a philosophy of culture. The latter, rather than being a particular branch of philosophy, cuts across various areas of disciplinary specialisation (cf. Böhme et al. 2000). In historical terms, cultural semiotics draws its inspiration from the development of "philosophical anthropology" (introduced by Immanuel Kant) and from the work of Ernst Cassirer (see Sect. 13.5 below) with its aim of going beyond purely empirical and quantitative approaches in the humanities (cf. Krois 2004, p. 281). In fact, the profound affinities between anthropology and philosophy – in the words of Clifford Geertz: "no borders anyone can, with any assurance, draw" (2000, p. ix) – will come full circle when applied not only to the level of objects studied, but when informing the methodological level of the endeavour as such.

In order to get a grip on the study of "thought forms" in cultural terms, let us remember that the semiotic areas of *syntactics* (dealing with the level of "signifiers"), *semantics* (dealing with the "signified", i.e. meanings), and *pragmatics* (dealing with sign users) have been modelled on Peirce's three semiotic disciplines (and their subject matters), i.e. *speculative grammar* ("the general condi-

(*pratītyasamutpāda*) as well as with regard to quantum mechanical views that leave behind mechanistic explanations of the universe as a collection of separately existing entities.

[32] An originally narrow conception of text as a sequence of (written) verbal signs developed in the context of philology has finally given way to a broad definition that (step by step including speech and then moving beyond such criteria as verbality, linearity and concreteness of elements) allows us to consider "any more-or-less complex sign token" as a text (Posner 2004, p. 14). In this sense we may follow the working definition of "text" as proposed by Marcel Danesi and Paul Perron, i.e. "a collation of signs taken from one or more codes in order to construct and communicate a message" (1999, p. 92).

<table>
<tr><th>cultural semiotics (Posner)</th><th>anthropological branch and relevant domain</th><th>anthropological subject matter ≙ SEMIOTIC EQUIVALENT</th><th colspan="2">Transdisciplinary model of a semiotic philology of thought forms (Lettner): its conception in terms of three pillars (corresponding to the classical philosophical dimensions of reality, language, and thought) in keeping with THE TRIADIC CONCEPTION OF THOUGHT FORMS</th><th>Focus of the envisaged cybersemiotic philology of Buddhist knowledge forms</th></tr>
<tr><td rowspan="4">CULTURE ≙ System of sign systems</td><td rowspan="2">Social culture
as the domain of
SOCIAL ANTHROPOLOGY</td><td rowspan="2">“Society”:
Institutions
Rituals
≙ SIGN USERS</td><td>TRIADIC CONCEPTION OF THOUGHT FORMS:</td><td>the three inter-dependent pillars</td><td rowspan="2">PROCESSES
synechistic conception of natural and cultural life forms
←→ agency
phenomenology of experience</td></tr>
<tr><td>culture-specific interpretation of thought forms as life forms</td><td>transdisciplinary
CULTURAL STUDIES
“reality”</td></tr>
<tr><td>Material culture
as the domain of
MATERIAL ANTHROPOLOGY</td><td>“Civilisation”:
Artefacts
(including skills)
≙ TEXTS</td><td>variously mediated textual forms and/ or textualised language forms</td><td>intercultural
PHILOLOGY
language (and various other media)</td><td>phenomenal objects
↑ OBJECTS ↓
objects of thought</td></tr>
<tr><td>Mental culture (i.e. “Culture” in the narrow sense)
as the domain of
CULTURAL ANTHROPOLOGY</td><td>“Mentality”/
Mentefacts
(ideas and values, including conventions)
≙ CODES</td><td>thought forms as specific ways of modelling the world in terms of objects, concepts, and processes ←→ epistemological knowledge forms</td><td>intercultural
PHILOSOPHY
“thought”</td><td>CONCEPTS
(as mental forms give rise to knowledge forms): cf. entities existing “in name only” (prajñaptisat); “apperception” (saṁjñā); “conceptual construction” (kalpanā), “dharmas” as “mental objects”</td></tr>
</table>

Fig. 13.8 A cultural-semiotic reconstruction of the research domains pertinent to a cybersemiotic philology of Buddhist knowledge forms
Figure 13.8. This table provides an overview of the semiotically reconstructed branches of anthropology and their respective subject matters as they have been integrated with a cybersemiotically enriched “philology of thought forms”. The branches of social, material, and cultural anthropology, which have been reconstructed by Posner in semiotic terms (as sign users, texts, and codes), can be seen to correspond to the classical philosophical dimensions of reality, language, and thought. Within the transdisciplinary model of “a semiotic philology of thought forms” (Lettner forthcoming-a), this comprehensive understanding of culture as a system of sign systems (Posner 1989, 2004) has been used for triadically modelling thought forms with regard to the three interdependent pillars of (transdisciplinary) cultural studies, (intercultural) philology, and (intercultural) philosophy. In keeping with this triadic conception of “life forms”, “(textualised) language forms”, and “(epistemological) knowledge forms”, the rightmost column shows how key questions related to the phenomenology of experience (“processes”), to phenomenal objects and/ or objects of thought (“objects”), and to knowledge manifesting as mental forms (“concepts”) enter into the respective domains of a cybersemiotic philology of Buddhist knowledge forms

tions of signs being signs”), *critical logic* (“the science of the necessary conditions of the attainment of truth”), and *universal rhetoric* (“...the transmission of meaning by signs from mind to mind...”) (*CP* 1.444). Peirce’s conception lies at the basis of the division developed by Morris in his *Foundations of the theory of signs* (1938), in which he defines Syntactics as “the syntactical relations of signs to one another”, Semantics as “the relation of signs to their designata”, and Pragmatics as “the relation of signs to their users” (see note 10 above). On this basis, I am following Posner (1989 + 2004), who has used the latter classification for semiotically reconstructing the branches of anthropology in terms of the material, mental, and social dimensions of culture: i.e. 1. with regard to the *artefacts/ texts* and *skills* of “material culture” (i.e. “civilisation” as the subject matter of material anthropology), (2) the *codes*, *mentefacts* and *conventions* of “mental culture” (cultural anthropology, including linguistics), and (3) with regard to the *institutions* and *rituals* of “social culture” (“society” as the subject matter of social anthropology).

In keeping with Lotman’s notion of the semiosphere (cf. Lotman 1990), Posner’s cultural-semiotic model makes clear how reality undergoes different forms of segmentation in the context of what are considered different cultures. In each case or culture, formerly unknown aspects of reality may be captured in terms of a cultural mechanism of *semiotisation* that occurs by means of identification and labelling within a hierarchically structured system of codes (cf. Posner 1989, pp. 268–277; Posner 2004, 21ff.). The latter is organised into a system of semiosic spheres (i.e. *counter-cultural*, *culturally peripheral*, and *culturally central* spheres), which are in turn surrounded by multiple layers of non-semiosic spheres (of what is unknown and therefore *extra-cultural*). Whenever there is a shift with regard to how these (categories of) spheres are divided, cultural change occurs: through the introduction of a new code, hitherto unknown world segments are put into relation with established forms of knowledge; conversely, reality loss takes place through an obliteration of codes and of corresponding knowledge forms through processes of *desemiotisation*. Summing up the findings with regard to the proposed transdisciplinary model of thought forms, the interdependence between the various disciplines, signifying dimensions, and domains of study can be visualised in the form of a simplified sketch (see Fig. 13.9).

Taking shape in the form of structures realised at various levels of paradigmatic organization, i.e. in Kuhnian terms, from “exemplar” via “disciplinary matrix” to the metaphysics of a worldview (cf. Rosa 2012), life forms arise from a network of fundamental conditions that provide a basis for how humans live, talk, think, and act (cf. Abel 2003). More precisely, through the “conceptual web” of a particular paradigm (cf. Rosa 2012), thought forms do not only passively convey and embody fundamental conceptions. Categorisations, values, and relevant distinctions (Lakoff 1987; Johnson 1987) are preserved and passed on through collective memory, tradition, and the transmission of learning (by means of texts and institutions), which includes an imagination of possible “scenarios” and “scripts” with regard to real-life situations (cf. Brown and Yule 1983). From the perspective of social philosophy, the body of phenomena that consists in the concepts, convictions, and modes of actions etc. of a particular culture presents itself as a holistic horizon of understanding that is only partially translatable into the matrix of meaning embraced by a different culture or explanatory paradigm (cf. Rosa 2012). Just as each culture has a tendency to preserve an identity in dependence upon the construction of counter-cultures (cf. Posner 2004, p. 23), when judging a different culture on the basis of one’s own cognitive-moral landscape, the assumed perspective cannot possibly do justice to the foundational assumptions of the other paradigm. Therefore, in order to make progress with one’s attempt at interparadigmatic and/ or intercultural understanding, the challenge is to get an idea of how the operational paradigm of a particular culture is constituted by conceptual and practical forms of knowledge (cf. Rosa 2012, pp. 38–46). This includes concrete modes of self-interpretation, patterns of evaluation, and a range of principally possible actions that all constitute what we

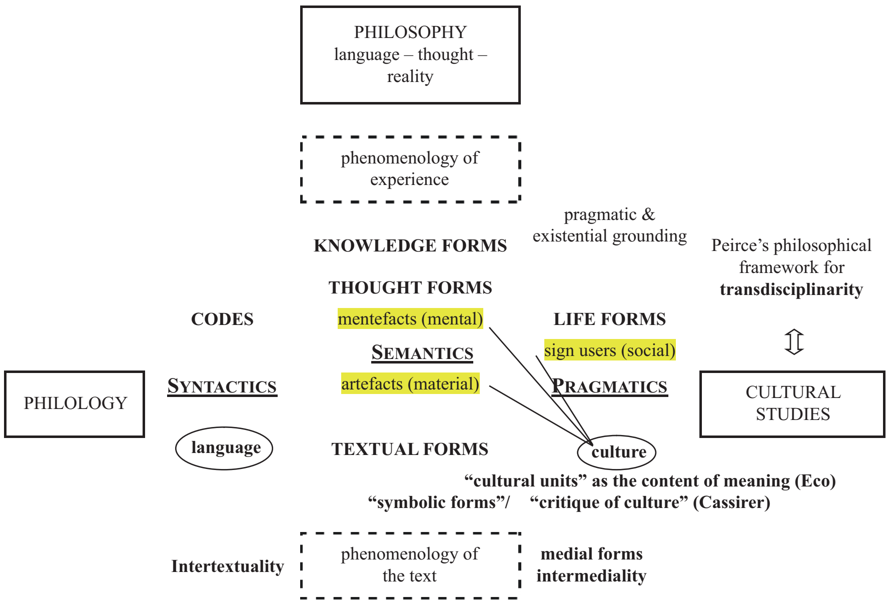

Fig. 13.9 A visual summary of the transdisciplinary framework for an intercultural-semiotic explication of "thought forms"

Figure 13.9. This sketch tries to explain how the *phenomenology of experience* as captured by the philosophical dimensions of *language*, *thought*, and *reality* is mapped onto what we may call the *phenomenology of the text*, i.e. specifically mediated textual forms that are embedded within social practices and thus within the sign systems of culture. Since thought forms typically manifest themselves as textualised language forms, language has been indicated as the prominent example of a code. As for the notion of culture, the latter may refer not only to a particular anthropological culture, but also to a scientific or religious subculture or paradigm of research. The material, mental, and social dimensions of culture (cf. Posner 1989, 2004) are captured by modelling "thought forms" (in the broad sense) in terms of an interplay between syntactics, semantics and pragmatics. Thus, in the *phenomenology of the "text"* (in a broad sense), artefacts and texts figuring in various medial forms of expression as "textual forms" make palpable in material terms the semantic level of meaning, which allows for the constitution of knowledge ("knowledge forms") by means of an interpretant in Peirce's sense: that is, by means of "mental signs" or concepts (as convention-based mentefacts that are typically coded as lexemes in a particular language and mental culture), whose employment is in turn embedded in the pragmatics of social culture, i.e. "life forms". Just as life forms are pragmatically and existentially grounded in the phenomenology of experience, the philosophical-anthropological dimensions of cultural studies are embedded within Peirce's comprehensive philosophical framework for transdisciplinarity. In each case, we need to consider the way in which under particular historical and anthropological conditions cognition becomes objectified at various levels of perception (cf. Eco 1973/1983, p. 186). Thus, analysis needs to look at how the coherence of signs, codes, and texts into "macrosignifieds" determines meaningful practices and "microsemiotic" instances of text-making (cf. Danesi & Perron 1999, pp. 194; 294), which in turn have the power to de- and reconstruct existing meanings. The cultural order, i.e. "the way in which a society thinks, speaks and, while speaking, explains the 'purport' of its thought through other thoughts" (Eco 1976, p. 61), can be grasped in the form of "cultural units", which is how meaningful content is structured by the semantics of a particular culture with the help of codes: an approach that is compatible with the "symbolic forms" described by Ernst Cassirer (see Sect. 13.5 below). The study of variously mediated textual forms ("medial forms") in turn links up with the approach of media studies, which looks at how the "multilayered, integrated ideational systems" of a culture are grounded in accepted value structures arising from (and giving rise to) some "overarching political-economic-cultural structure" (cf. Lull, 1995, pp. 10–11)

have defined as falling under the concept of "life forms". The chance now is to (at least partly) *participate* in those life forms in order to *understand* what is primarily embodied in practice and not accessible to mere observation (cf. loc. cit., p. 43).

Just so, with its aim of welding cybersemiotics, Buddhist philosophy, and a semiotic philology of thought forms into the transdisciplinary and intercultural approach of a cybersemiotic philology of Buddhist knowledge forms, the here envisaged approach seeks to respond to the need for creating a common metalanguage through scholarly practice itself: i.e. by openly comparing (what) categories (are relevant to each system), by participating in the conceptual worlds of the different languages and by reciprocally "impregnating" systems of terminology. The idea is to create a more comprehensive conception of life forms by bringing in both a bio- and cybersemiotic perspective on Peirce's habit (including the structural couplings of cognitive biology) on the one hand and the forms of living embodiment recognised by Buddhism in the form of psycho-physical dispositions or "habit-formations" (Skt. pl. *saṁskārā*) on the other hand: such a new horizon of understanding will be suitable for phenomenologically theorising selfless agency and for undoing objects and concepts in process-philosophical terms. While the notion of culture is based on extensive similarity of traditions and defined with regard to conventionalised codes that are passed on over several generations among the members of a group, biological mechanisms of transfer are adduced for explaining how the "natural codes of a living being" are passed on to future generations through heredity (cf. Posner 2004, p. 4). Peirce's evolutionary concept of the symbol allows us to consider both natural and conventional signs (cf. Nöth 2010) as well as innate and acquired forms of expression as being differentiated only in gradual terms on the basis of his synechistic understanding of continuity. In view of this, the conception of life forms will profit from a broader definition in keeping with Peirce's process-philosophical view on biological, mental, and social habits. Taking up the notion that "biosemiotics is well positioned to contribute valuably to the development of phenomenology" (Tønnessen, Maran and Sharov 2018), the present attempt at working out the non-anthropocentric potential of Buddhism may join forces with the suggested synergies between phenomenology and biosemiotics in order to leave behind "the misguided idea that all phenomena are human phenomena" (loc.cit, p. 6). In other words, the cultural-semiotic view of life forms will need to be broadened by integrating it with the transdisciplinary framework of "cybersemiotics" and its bio-psycho-socio-semiotic model of autopoietic "signification spheres" (Brier 2008; see note 62 and more generally, the discussion starting with Sect. 13.4 below).

13.3 Classical Forms of Knowledge Representation

Investigating "thought forms" as paradigmatic (i.e. culture-specific and relatively coherent) modes of modelling the world in terms of "objects", "concepts", and processes of signification is meant to make clear the implications of philosophical choices for the constitution of knowledge forms. In this section we are going to do so by (however briefly) looking at the philosophical approaches of Aristotle and Indian Buddhism as well as at the (philosophical) discourse of modern science. Reconstructing thought forms is going to bring to the fore both commonalities and differences with regard to their underlying representational paradigms. By using Peirce's model as a point of reference we can try to depict in semiotic terms what particular configuration of logical (incl. phenomenological), ontological, epistemological, and linguistic dimensions characterises the relevant paradigmatic mode of knowledge representation. The flexibility of the Peircean model of semiotics, including its broad conception of a semiotic object[33], allows us to portray the different philosophical positions taken by approaches that operate with very different assumptions concerning such foundations as logic and the categories.[34] Thus, Peirce provides us with a semiotic framework of description that is suited well for modelling the opposing notions of substance (*οὐσία*; *ātman*) and essencelessness (*śūnyatā*, *anātman*), which are characteristic of substance-centred positions and Buddhism respectively. Within a global-historical context, the Aristotelian model of categories offers itself as a valuable basis from which to work out basic parameters of order and reason with regard to an intercultural history of linguistics and philosophy as well as science. However, what this implies is an attempt to understand the Aristotelian model precisely *not* as a supposedly neutral basis for comparison, but rather as a text that allows us to catch a glimpse of how the basic parameters of Western reason have been constituted (cf. Rath in Aristotle 1998a, p. 102). Such an assessment of historical developments may at the same time be used for the programmatic attempt at explicating "reason" (λόγος) and associated notions of truth and objectivity in thoroughly dialogical terms, i.e. from both an intercultural and a transdisciplinary perspective. On the basis of this model an attempt will be made to show how modern scientific notions of objectivity can ultimately be traced back to such early philosophical conceptions as those formulated by Aristotle in his *Categories* and *Metaphysics*, including the definition of substance.

The science of "being qua being" (cf. Metaphysics IV 1003 a 21ff, Aristotle trans. 1978), to be called "metaphysics" only later, just as "ontology" as the science of being was "invented" in the seventeenth century (cf. Halbfass 1992, p. 2), was

[33] "The Objects–for a Sign may have any number of them–may each be a single known existing thing or thing believed formerly to have existed or expected to exist, or a collection of such things, or a known quality or relation or fact, which single Object may be a collection, or whole of parts, or it may have some other mode of being, such as some act permitted whose being does not prevent its negation from being equally permitted, or something of a general nature desired, required, or invariably found under certain general circumstances." (*CP* 2.232).

[34] More precisely, when trying to model naturalistic as opposed to conventionalist positions, the particular value of Peirce's approach lies in allowing us to define the various positions in the sense of a semiotic matrix (Wallmannsberger 2002): thus, while the radically conventionalist and inductive position of a thinker like John Locke implies that a sign is something that has empirically condensed out of experience, according to the rationalistic focus on the capacity of the human mind, empirical stuff is considered as being already organised by rational categories in the first place (cf. pp. 117–118).

determined by Aristotle as "first philosophy" (*πρώτη φιλοσοφία*): an order that was going to be inverted with the advent of modern science as physics came to be proclaimed as "the queen of the sciences" (Nicolescu 2002, p. 11). Within the context of Aristotelian philosophy, the notion of "substance" or "essence" *(οὐσία*; cf. Latin "essentia") serves to guarantee the "ontological primacy of objects" (cf. Frede 1992, p. 99). By contrast, what matters in (Abhidharma) Buddhism is precisely the opposite move of arriving at "ontological primitives" (cf. Arnold 2005) that are characterised by "analytical ultimacy" (Williams 1980) (see note 35). In an overall sense, the process-ontological approach of Buddhism refuses any notion of permanent self or substance (*ātman*) by deconstructing both ordinary macroscopic "objects" and human "subjects" into minimal constituents of experience, i.e. so-called "dharmas". However, such temporary flashings of *dharmas* are understood to enter into the phenomenology of experience in keeping with the laws and regularities of "dependent arising" (*pratītyasamutpāda*) (cf. Lettner 2020, 191ff.).[35] Summing up the central aspects of both Aristotle's philosophy and the common tenets of the Buddhist philosophical approaches, the Aristotelian and Buddhist knowledge forms can be characterised with regard to the dimensions of ontology, logic, epistemology, and language as follows (see Fig. 13.10).

In his logical works, Aristotle links the notion of "essence" (*οὐσία*) to that of "definition" (*ὅρος, ὁρισμός*, cf. Greek ὁρίζω "to limit" and English "horizon") by making a definition "an account (*logos*) that signifies an essence" (*Topics* 102a3 as qutd. in Cohen 2020, *SEP* no. 7).[36] What is it that makes Buddhist *dharmas* differ from (Aristotelian) substances? In various commentarial texts *dharma* is defined as "upholding/carrying" "intrinsic nature" (*svabhāva*) or as that which bears "(uniquely) defining characteristics (*svalakṣaṇa*)" (*AKBh* 1.2b = Poussin/Pruden 1988, Vol. 1, p. 57) (cf. Cox 2004, pp. 558–559; 584)[37]: i.e. definitions that

[35] It is precisely by analysing "the structure of the conditioning interconnections that underlie the gross, composite objects of ordinary experience" that deconstructive analysis as the *key scholastic activity* is understood to reveal "the way things really are" (*yathābhūta*; cf. *yathābhūtam*, "as it really is") (Cox 2004, p. 549). More precisely, (ordinary) objects are regarded as being merely "derivative entities" (*prajñaptisat*) because they can be further dissolved into "ultimately existent" and thus "substantial" entities (*dravya*) (cf. Williams 1980, p. 5). In the *Abhidharmakośa* (see the final note in this chapter), Vasubandhu's standard Ābhidharmika enumeration of 75 *dharmas* presents us with *dharmas* as "*categories* of ontological primitives" (Arnold 2005, pp. 17–18): while the Vaibhāsikas admit such category sets as the five *skandhas* (see Fig. 13.12 and the beginning of Sect. 13.6) to be "substantial" (*dravyasat*), the Sautrāntikas deny this because the *skandhas* can be reduced to specific *dharmas* (e.g. the five bodily senses) as contained in the standard list (loc. cit. p. 225).

[36] This understanding of a definition as "an account which signifies what it is to be for something" (*logos ho to ti ên einai sêmainei*) becomes formulaic in the sense that a definition expresses "the what-it-is-to-be" (*to ti ên einai*), which in modern terminology is its essence (Smith 2017, *SEP* no. 7.1). In his *Analytics*, Aristotle proceeds from what in the *Categories* he terms *λόγος* ("expression") to the notion of "concept" or "definition" (*ὅρος*), which is meant to prepare safe and stable ground for logical operations as employed in syllogism (Rath in Aristotle 1998a, p. 103).

[37] A word on translating these key terms, which are compounds whose first element is the prefix *sva-* ("self"- or "own"-) added to *bhāva* ("becoming", "being" cf. √*bhū* "to become/be") and *lakṣaṇa* ("mark", "sign", "characteristic"): though etymology would seem to allow for a word-by-

Philosophical branch	Aristotle (384-322)	Buddhist philosophy	
Ontology Parallel conception of categories as • forms of being, • forms of thought • forms of predication with Aristotle (cf. Oehler 1984; Köller 1988) noun ("substantive") as the "substrate" (*ὑποκείμενον*), cf. Latin *subiectum* / *substratum* Analogy between "substance" and the "subject" of predication in Western grammar	*Categories* *Metaphysics* "substance" or "essence" (*οὐσία*) → substance ontology Socrates or a horse as a primary substance ontological primacy of objects "definition" (*τὸ τί ἦν εἶναι*) as the statement of essence; "genus" (*γένος*); "property" (*ἴδιον*) common to class members; "accident" (*συμβεβηκός*) ~ attribute	Vasubandhu (4th – 5th century CE) *Treasury of Higher Knowledge* (*Abhidharmakośabhāṣyam*) *dharma* as "that which bears (uniquely) defining characteristics" (*AKBh* 1.2b) *svalakṣaṇas* $\triangleq$ (uniquely) defining properties or characteristics enumeration of ontological primitives definitions that individuate → *dharmas* as categories *dharma* taxonomy: 75 dharmas as types potentially innumerable tokens *dharmas* as tokens "conditioned arising" (*pratītyasamutpāda*) "interdependent existence" no-substance ontology	Dignāga (ca. 480-540) "Collection [of remarks] on the means of [valid] cognition" (*Pramāṇasamuccaya*) *svalakṣaṇas* $\triangleq$ (irreducibly unique) concrete particulars as direct objects of perception (*pratyakṣa*) $\triangleq$ a perceptual cognition that is solely determined by its object (i.e. causal interactions with *svalakṣaṇas* as unique particulars) (causal efficacy) *svalakṣaṇas* as the ontological primitives
Logic	"definition" or "concept" (*ὅρος*, *ὁρισμός*) as an "account" (λόγος) that signifies an "essence" (*οὐσία*)	no enduring agent/ substrate; no "underlying substances" for *dharmas*; no attribution of sense data to a "property-bearer" (*dharmin*) → Dignāga on perception vs. inference	Dignāga's method of "exclusion" (*apoha*) for demarcating the boundaries of an abstract concept
Epistemology	secondary substances function as universals horse $\triangleq$ the species	concept-free perception (*pratyakṣa*) excludes * association of a name (*nāman*) * assignment of a class-property/ "genus" (*jāti*) etc. to a percept	conceptual elaboration "inference" (*anumāna*) has the "universal" (*sāmānyalakṣaṇa*) as its object
Language	predication of truth and falsity (*Hermeneutics*)	truth = non-predicative (linguistic) "fixing of an object" (*artha-niścaya*) refused	perception of reality is decisively non-linguistic: cf. *perceiving* blue (*nīlaṃ vijānāti*) vs. *conceiving* that *something is* blue (*nīlam iti vijānāti*)

Fig. 13.10 A comparative overview of Aristotelian and Buddhist knowledge forms
Figure 13.10 This comparative sketch of knowledge forms gives an overview of ontological, logical, epistemological and language-related parameters (including different views on *dharmas* and the phenomenology of perception) as they are relevant to reconstructing knowledge forms with regard to Aristotle as well as Vasubandhu and Dignāga, whose approaches are philosophical landmarks in their respective intellectual and cultural traditions. Against this background it would be interesting to further work out the epistemological implications of the various paradigmatic approaches, e.g. by comparing the Buddhist notion of an unverbalisable "perception" or "unmediated awareness" (*pratyakṣa*) to what Aristotle calls *ἡ τῶν ἀδιαιρέτων νόησις* (*hē tōn adiairétōn nóēsis*, *On the Soul*, G, 6, 430 a 27), i.e. "the simple act of apprehending the essence or *ousia* of a thing in an idea", which is however "expressible in a term, predicate or category" (cf. Sheehan 1988, p. 68)

individuate *dharmas* as categories or types of potentially innumerable tokens (Arnold 2005, p. 22; 28). With individual *dharmas*, determination by "intrinsic nature" (*svabhāva*) also entails that entities are "real" or "substantial" (*dravya*) in the sense of "ultimate existence" (*paramārthasat*) (Cox 2004, p. 569; see also note 37). Though inviting comparison with Aristotle's notion of essence as being the ontological correlate of a definition (cf. Arnold 2005, pp. 19–20), these

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word translation of *svabhāva* as "own-being", "self-nature" or indeed "essence" in a way that is similar to Greek *οὐσία* and Latin *essentia* (see also note 1 above), such translations risk conflating the idea that a certain "defining property" is unique or proper to its bearer with an ontological idea of "essence" (Arnold 2005, p. 19; 223). In fact, the very notion of "absolute truth" or "ultimate existence" (*paramārthasat*) aims at characterising *dharmas* as "irreducible ontological primitives" (Arnold 2005, p. 21) (see note 35 above) by distinguishing them from the "conventional truth" or "relative existence" (*saṁvṛtisat*) of composite objects like a jar or (water-) jug (thus the standard example of a *prajñaptisat* entity), whose concept or idea does not arise when it is broken into pieces (or deconstructed in mental terms) (cf. *AKBh* 6.4 = Poussin/Pruden 1991, Vol. 3, pp. 910–911).

commentarial definitions of *dharmas* do not assume an enduring agent, substratum or any underlying substances: rather, the *svalakṣaṇas* also occur in keeping with causally and dependently arising conditions (Ronkin 2018, *SEP* no. 4). Such a view clearly differs from Aristotle's notion of "individual substances" like *this man* or *that horse*, which are understood to possess their qualities as accidental characteristics inhering in them (cf. Cohen 2020, *SEP* no. 6). Including some "thing" like a horse or a table in the respective class "horses" or "tables" would be considered as the creation of a merely "nominal" *prajñaptisat* entity as a reflex of *saṁjñā*, involving an apprehension of specific "marks" (*nimitta*) as the "signs" of class membership (cf. Williams 1980, pp. 16–17; see the brief discussion of *saṁjñā* towards the end of Sect. 13.7 below).

With Dignāga, *svalakṣaṇas* come to mean the unique, discrete phenomena that are the direct objects of perception and which as the "ontological primitives" do not admit of any definition (cf. Arnold 2005, p. 28). In *Pramāṇasamuccaya*, his most mature work, which is a "collection [of remarks]" (*samuccaya*) on the "means of [valid] cognition" (*pramāṇa*) (cf. Dignāga 1968, trans. Hattori; Hayes 1980), Dignāga recognises only two *pramāṇa*s: 1. "perception" (*pratyakṣa*) in the sense of "sensation", i.e. "direct, unmediated cognition or immediate awareness", and 2. "inference" (*anumāna*), whose indirect, mediated cognition includes also verbal communication inasmuch as linguistic signs function like inferential signs (*liṅga*) (cf. Hattori 1968, p. 78; Hayes 1980, p. 222; Hayes 1988, 187ff.); the "particular" (*svalakṣaṇa*) and the "universal" (*sāmānyalakṣaṇa*) are the respective objects of these two *pramāṇas*. What is excluded through the stipulation that "perception (*pratyakṣa*) is free from conceptual construction (*kalpanā*)" (*PS* 1 C. k. 3c, cf. Dignāga 1968, p. 25) is the association of a name (*nāman*), genus (*jāti*) etc. with something perceived (k. 3d, ibid.), which would imply a sort of generalising synthesis of "particulars into multi-propertied 'objects'" (cf. Hayes 1980, pp. 223–224) – quite in contrast to the "inexpressible particularity" (*avyapadeśya*) of the *svalakṣaṇa* (cf. Dignāga 1968, p. 24). While for Aristotle the notion "that *this is a horse* is a kind of brute fact, devoid of metaphysical structure", the horse actually being a primary substance (cf. Cohen 2020, *SEP* no. 6), Dignāga recognises a fundamental distinction between *perceiving* blue (*nīlaṃ vijānāti*) and *conceiving* that *something is* blue (*nīlam iti vijānāti*) (*PS* 1. Daa – 2, cf. Dignāga 1968, p. 26; cf. a. Williams 1980, pp. 16–17). Thus, we can say that a judgement of the sort "This is a horse" or "This is blue" (This is x) involves a conceptual cognition that – unlike the bare cognition of a particular – involves a "metaphysical construction that assumes the color to be a characteristic or property (*lakṣaṇa*) of a really existing object" (Kalupahana 1992, p. 197). While *pratyakṣa* provides immediate awareness of visual, auditory, olfactory etc. sensa, the act of attributing such disparate sense data as "properties" (*dharma*) to a "property-bearer" (*dharmin*) is not an act of sensation, but a mental act of interpretation; the Sanskrit grammatical notion of a "substratum" or "subject" in which a property occurs belongs to discussions of inference and logic (cf. Hayes 1988, p. 137–38; p. 146). (Also see the brief discussion of cognitive invariants and universals in Sect. 13.8, incl. note 63, below). According to Dignāga, "the certainties that logical thinking generates through the formulation of absolute universals […] are no more than metaphysical conceptual constructions" (*kalpanā*) (Kalupahana 1992, p. 205). While Aristotle's understanding of a universal and Dignāga's solution to the matter (cf. Hayes 1988, 183ff.) can only be hinted at in this context,[38] the decisive point about Dignāga's approach is his refusal to treat universals in a realistic way (Kalupahana 1992, pp. 202–203). The way in which the boundaries of an abstract concept can be demarcated by Dignāga's famous method of "exclusion" (*apoha*) (cf. Hayes 1988, 188ff.) can be briefly illustrated by the example that e.g. whiteness is determined in relation to non-whiteness (rather than in contrast to blackness) (Kalupahana 1992, p. 203).

Turning to a brief outline of modern scientific knowledge forms, we will find that their classical ontology has historically grown out of the epistemic conditions set by the substance-philosophical foundations of Aristotelian metaphysics. More precisely, the paradigm of classical physics rests upon the assumption of a number of rigid distinctions, most importantly the opposition between the subject and the object of scientific observation and philosophical analysis. Before thermodynamics as the science of heat opened up new lines of inquiry with regard to irreversible processes (Prigogine and Stengers 1984, 105ff.), particles and fields were understood to be "essentially independent of the human observer", and the same objective laws were understood to apply to both the observing apparatus and the observed system (Bohm and Hiley 1993, p. 13), including the measurement process and the entire universe. The assumption of transcendental laws (and the reversibility of processes in time) implied the notion of an "ideal objective observer in natural science" in the sense of "Laplace's demon" (cf. Brier 2008, p. 104). The basic coordinates of what the mechanistic order of physics amounts to have been summed up by David Bohm (1980) as follows: "...the world is regarded as constituted of entities which are outside of each other, in the sense that they exist independently in different regions of space (and time) and interact through forces that do not bring about any changes in their essential natures. The machine gives a typical illustration of such a system of order" (p. 173).

In contrast to the Aristotelian notion of inner forces understood to organise and structure matter "from within" (Prigogine and Stengers 1984, p. 40), the mechanistic order of modernity operates with a notion of *machina mundi* (Gloy 1995, p. 162) that narrowed down the four causes of Aristotle to the efficient cause (*causa efficiens*), reducing the more comprehensive notion of ancient causality to local causality (cf. Bohm 1980, 12ff.; Nicolescu 2002, p. 11). As Newton's mechanics comes to constitute the "foundational paradigm" for explaining the universe, physics as the science of nature[39] comes to be equated with mechanics as the science of machines (Gloy 1995, p. 163), and natural scientific forms of gaining knowledge come to rank first within the hierarchy of academic disciplines (Walach 2005, p. 237). In keeping

[38] On the basis of Aristotle's notion of a "substantial form" as the essence of a substance, which is denoted by the definiens of a definition, we can say: "Since only universals are definable, substantial forms are universals [...] being 'predicated of many' is what makes something a universal (*De Interpretatione* 17a37)" (cf. Cohen 2016, *SEP* no. 10).

[39] as is indeed obvious from etymology (cf. Greek *phýsis* "nature", *phýo* "to grow").

with such as materialistic and logical empiricist understanding of physics as “the foundational science closest to objectivity” and thus as “the model science for all other systems of knowledge”, all other sciences were then expected to accordingly reduce their explanations (Brier 2008f, p. 105). The impasse created by such a mechanistic understanding of life and living beings confronts us with the need for creating a framework for knowledge that allows us to work on the basis of phenomenological foundations and within a holistic framework through the combined efforts of cybersemiotics and Buddhist philosophy.

13.4 Towards a Cybersemiotic Philology of Buddhist Knowledge Forms

In trying to develop more explicitly both the non-anthropocentric dimensions and the process-philosophical potential of Buddhism and cybersemiotics, this chapter takes up and responds to the crucial problem pointed out by Brier (2018f): i.e. how can we “establish a philosophical framework encompassing natural science, evolution and the phenomenology of an experiential mind’s agency” (p. 20). Paradoxically, the advances made in the life sciences like biology have come to “effectively deny any reality to life” (Simeonov et al. 2017, p. 1): the key phenomenon of consciousness somehow got lost through modern scientific and philosophical commitment to objectivity. We will therefore need to accomplish “a bridging of the gap between science and philosophy” through the combined efforts of various Eastern and Western approaches (ibid.). By recasting “‘information’ as semiosis in living systems”, biosemiotics is in fact committed to such a profound “science-humanities interdisciplinarity” (Wheeler 2011, pp. 2; 4). Moreover, modern systems biology, with its attention towards processes rather than towards molecular biological components, shares a number of significant insights with Buddhism (Noble 2016). The transdisciplinary framework of cybersemiotics, with its integration of biosemiotics alongside the research programmes of information theory, second-order cybernetics and system science, cognitive science, as well as pragmatic linguistics (cf. Brier 2008, p. 33), provides us with an ideal approach for developing the synergistic potential of a cybersemiotic philology of Buddhist knowledge forms. Going beyond an isolated study of natural and cultural phenomena, cybersemiotics allows us to embrace natural-scientific and humanistic insights in the spirit of Peirce’s philosophical synechism. Working along these lines we can set out to refine a universal concept of information in phenomenological, process-philosophical, and intercultural terms along the lines of Buddhist philosophy. The current contribution thus also responds to the call for an (intercultural) alternative to “the numerous compartmentalizing approaches to nature and culture” (Cobley in Favareau et al. 2017, p. 16) as envisaged already years ago by the project of “a unified doctrine of signs embedded in a vast, comprehensive life science by Thomas Sebeok (Sebeok 2001, p. 159 as quoted ibid.).

Considering the deep significance of the humanities to the study of biosemiotics (Favareau et al. 2017), which includes a fundamental interdependence that is reflected in the "evolutionary history of biosemiotics" itself (Favareau 2010), let us take a look at what is common to the transdisciplinary framework of cybersemiotics and to the endeavours of an intercultural semiotic philology of thought forms as sketched above. The latter, with its interest in a comparative appraisal of specific constellations of logic, grammar, ontology, and epistemology resonates well with the reliance of cybersemiotics upon a phenomenologically based semiotic ontology of dynamic forms for solving questions of transdisciplinarity (Brier 2018a). Through an intercultural-philological explication of reason and of philosophical categories, the semiotic philology of thought forms intends to achieve a philological enrichment of cybersemiotics. Conversely, cybersemiotics with its interest in "hermeneutics as the socially reflected study of text interpretation" (Brier 2008, p. 40) can profit from the non-reductive understanding of philology as a "global knowledge practice" (Pollock 2009) as embraced by an intercultural semiotic philology of thought forms (see Fig. 13.11 below).

As Fig. 13.11 shows us with regard to the underlying frameworks of cultural studies and biosemiotics, possible overlaps between a semiotic-philological study of thought forms and cybersemiotics can best be sought with regard to the notion of

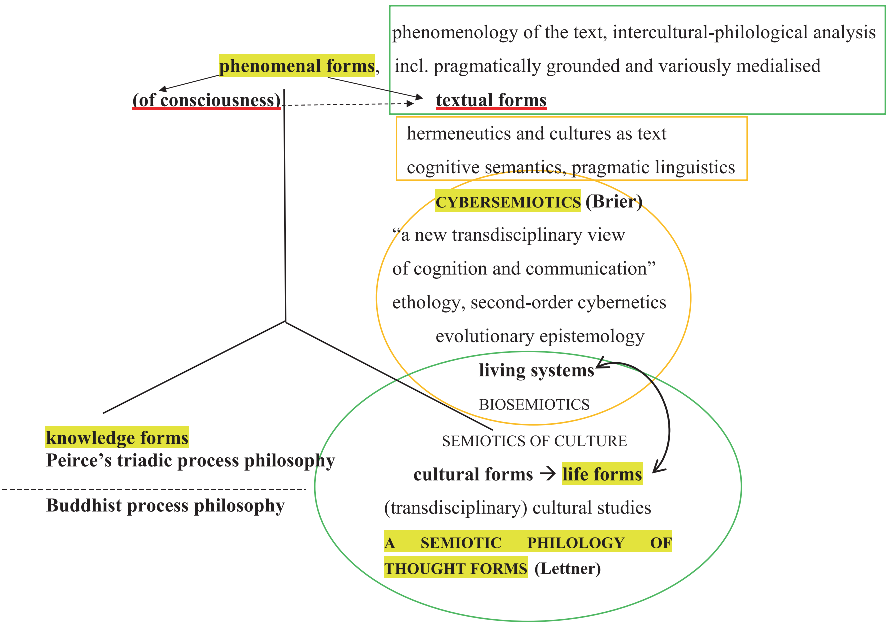

Fig. 13.11 The common transdisciplinary framework of cybersemiotics and an intercultural semiotic philology of thought forms
Figure 13.11. The common transdisciplinary framework of cybersemiotics and an intercultural semiotic philology of thought forms includes areas of theoretical and methodological overlap that can be used for creating a cybersemiotic philology of Buddhist knowledge forms

life forms. To start with, let us remember that the "new transdisciplinary view of cognition and communication" forged by cybersemiotics (cf. Brier 2008) rests upon a Peircean foundation "that allows for biosemiotics and evolutionary epistemology to integrate recent developments from ethology, second-order cybernetics, cognitive semantics, and pragmatic linguistics in a fruitful way" (p. 276). Against this background, cybersemiotics relies upon hermeneutics in its broadest possible sense as "a general systematic study of interpretations of text (cultures as text)" (loc.cit, p. 445). From a philological point of view, the latter definition can be rendered more precise with regard to Posner's semiotic-anthropological definition of culture as discussed (with regard to Fig. 13.8) above. Thus, cybersemiotics will profit from the anthropologically informed explication of culture as a sign system consisting of sign users, texts, and codes suggested by Posner: i.e. a semiotic reconstruction of the social, material and mental domains of anthropology, which tells us that the notion of "cultures as text" refers only to the dimension of "material culture" or "civilisation" (cf. Posner, 1989, p. 261). Moreover, hermeneutics can be used as an entry point for working out the possible contribution of an intercultural semiotic philology of thought forms to cybersemiotics. To start with, let us take a look at the benefits of hermeneutics when approached from an intercultural-philosophical perspective. Clearly, what needs to be overcome is a stance that misses the significance e.g. of Indian (Buddhist) texts in their home cultures by simply importing Western hermeneutical models (cf. Garfield 2002, p. 8). Therefore, instead of merely analysing Buddhist theories from a semiotic perspective, the present chapter seeks to supplement and refine the methodological apparatus of (cyber-)semiotics itself by bringing in (the terminology reflecting) such highly elaborate analyses of language, logic and consciousness as have been developed by various non-European approaches of Buddhist philosophy: a tradition that is multifaceted in itself, as can be seen with regard to the different epistemological positions embraced by proponents of Vaibhāṣika, Sautrāntika, Madhyamaka and Yogācāra Buddhism (as set out in Fig. 13.7 above). It is through a philologically informed and contextualised consideration of textual documents from those various traditions that (cyber-)semiotics can be developed in intercultural-philological terms. While in the present chapter we can only look at how core issues of Buddhism may be combined with a cybersemiotic approach, we would need to engage more deeply with the development of philological practices in both the Indian and the Western traditions in order to flesh out more fully the envisaged cybersemiotic philology.[40] Exemplary attempts at

[40] As can be seen from the linguistic traditions of Hebrew, Sanskrit, Greek, and Arabic, the development of semantics has been typically linked to exegetical efforts concerning the interpretation of canonical (and frequently religious) texts (cf. van Bekkum et al. 1997). In Western intellectual and cultural history, philology was born in ancient Greece during the Hellenistic age (ca. 3rd-1st cent. B.C.E) in the cities of Alexandria (with its famous library and museum) and rivalling Pergamum (cf. Montanari 2015). Starting from the aim of establishing a good text of Homer, the activity of the *grammatikoí* ("scholars") involved practices like continuous commentary, collections of peculiar words ("glosses") as well as corrections, emendations and "critical signs" (Greek sg. *semeion*), thereby increasingly focusing attention on the work in its own right (in the sense of "editing a text") rather than on correcting a single copy (cf. pp. 26–34). As a result of developments in recent

bringing in the philological dimension have been made by modelling thought forms (of signlessness) in intercultural-philological terms with regard to Buddhist philosophy (cf. Lettner 2020) and by "impregnating" semiotics with Buddhist conceptions in the context of a Peircean (phenomenological) study of Abhidharma theories of consciousness and perception (cf. Lettner 2021). The way in which "phenomenal forms" (of consciousness) can be conceived with regard to *dharmas* needs to be set out in more detail by taking "Buddhist phenomenological steps to an intercultural cognitive semiotics" (Lettner forthcoming-d).

Conversely, i.e. in addition to such an enrichment of cybersemiotics with philological expertise, the traditionally subject-centred approach of intercultural hermeneutics will be shown to profit from the larger, transdisciplinary and

history, the challenge is now to react to the "debilitation of the philological humanities" – caused by disciplinary fragmentation and its "dispersion of *a core knowledge form* across ever smaller, weaker, and more disposable academic units" – into "a unified transregional and transhistorical academic discipline" (Pollock 2015a, pp. 16–18, my emphasis): a task of reconceptualisation that (as I firmly believe) can profit from the transdisciplinary framework of Peirce's philosophy that is guiding my "semiotic philology of thought forms", including synergies with Brier's cybersemiotics as set out in this chapter. While in the Sanskrit tradition philological practices were never identified with a single term covering such interpretive protocols as a separate "knowledge form" (*vidyāsthāna*), indologist Sheldon Pollock explains that a comprehensive account of Sanskrit philology (as practiced with regard to both Vedic texts and secular poetry) would need to address the core *śāstras* ("sciences") of grammar, hermeneutics (*Mīmāṁsā*), and logic (*nyāya*) as well as lexicography, metrics, and rhetoric (*alaṅkāraśāstra*) (cf. Pollock 2015b, p. 115), the latter dealing with figures of speech (lit. "ornaments" [of composition]). In the context of the present excursion, suffice it to say that philosophical reflections and an intense engagement with language have been intricately linked from the very beginning in ancient India. Within the ritualistic context of religion, various methods of oral recitation were developed for the purpose of preserving and transmitting the sacred hymns of the Veda (lit. "knowledge"). Against this background of linguistic codification and ritual, six auxiliary sciences were developed: i.e. the so-called "limbs of the Veda" (*Vedāṅga*) comprising four disciplines of the study of speech (i.e. *śikṣā* "phonetics", *vyākaraṇa* "grammar", *nirukta* "etymology", and *chandas* "metrics) besides astronomy (*jyotiṣa*) and ritual (*kalpa*) (cf. Filliozat 1992/2000, 18ff.). Not only did grammar (*vyākaraṇa*, lit. "analysis") function as "the >prime mover< of Vedic studies", but the epistemological inquiry of philosophers naturally included philosophy of language as part of the interest in the "valid means of knowledge" (*pramāṇa*) in the context of a "theory of knowledge" (*pramāṇa-śāstra*) (Matilal 1992); hence, the Veda was of prime importance as a textual embodiment of truth with regard to the means of knowledge called "verbal testimony" (*śabda*) (p. 76). Among the orthodox schools of Indian philosophy, i.e. Sāṁkhya and Yoga, Nyāya and Vaiśeṣika, Mīmāṃsā and Vedānta, which accepted the authority of the Veda, all of them accepted the knowledge to be gained from a "linguistic utterance" (*śabda*): i.e. except for the Vaiśeṣikas, who (like the "unorthodox" Buddhists) accepted only "perception" (*pratyakṣa*) and "inference" (*anumāna*) (cf. ibid.). By contrast, the Buddhist theoretical view of language as a practical means of communication (rather than as a sacrosanct medium disclosing eternal relations) is reflected in the use of various different languages of textual transmission and translation. Thus, besides the languages of the early Buddhist tradition, notably Pāḷi as used by the Theravādins and (the Northwestern Prakrit) Gāndhārī as well as Buddhist Hybrid Sanskrit used by other groups, in the course of the geographical expansion of Buddhism, texts became translated into languages like Chinese and Tibetan (cf. Oberlies 2000, p. 173). See also the paragraph that briefly discusses the Buddhist textual transmission in the passage dealing with the philological pillar of textualised "language forms" (following Fig. 13.7 above).

process-philosophical approach taken by cybersemiotics. For the overall aim is to arrive at a more comprehensive conception of both natural and cultural life forms within the context of the proposed cybersemiotic philology of Buddhist knowledge forms. In order to develop the foundations for such a cybersemiotic reading of Buddhist philosophy (and vice versa), we can start from the so-called cybersemiotic star for investigating how four main areas of knowledge arise: i.e. from 1. the physical-chemical-informational dimension of nature, from 2. biological life as the level of organic evolution and embodiment, from 3. the phenomenological-hermeneutical-individual-psychological level of consciousness, and 4. the socio-cultural level of meaning (Brier 2008, 361ff.; Thomsen and Brier 2014, 22–23; see also Zhou. Chap.11 in this book). On this basis, the cultural-semiotic model of the signifying order pertaining to body, mind, and culture (Danesi and Perron 1999, p. 69) can be integrated with the more comprehensive cybersemiotic approach, whose "cybersemiotic star" captures all the latter dimensions in addition to the dimension of physical nature (explained as originating in energy and matter). Along the same lines, Posner's semiotic reconstruction of anthropological categories in terms of the material, mental and social dimensions of culture (1992) can be roughly mapped onto the biological, psychological, and social-communicative levels of cybersemiotics as developed by Brier on the basis of Luhmann's theory of autopoiesis and its integration with biosemiotics (Brier 2008, 392ff.).

The cybersemiotic proposal for producing a transdisciplinary concept of information (Brier 2017d) goes decisively beyond statistical and mathematical definitions of information as associated with the modern development of information science (and the tradition of Claude Shannon and Norbert Wiener). In fact, the controversial nature of the very term "information" in biosemiotics is due to the possible mechanistic connotations coming from "its affinity to sciences close to the development of technology and computing methods" (Cannizzaro 2016, p. 314). While the notion of "coded information" no longer assumes any rigid distinction between a natural-scientific paradigm of *Erklären* ("explanation") and a humanistic paradigm of *Verstehen* ("understanding"), information theory brings "nature" and "culture" closer at the cost of equating processes of cognition and calculation (Assmann 1997, p. 725–26). However, materialistic ontologies that start from matter, energy, and/ or an objectivistic concept of information (that is per definitionem "without meaning") cannot explain how the "inner world" of first-person experiences (encompassing such phenomena as awareness, qualia, feeling, emotions and will) – or indeed life as such – could emerge from such foundations (Brier 2008, 363ff.). The strengths of Peirce's approach come from installing "qualia and mind – as semiosis" (ibid.) from the very beginning by integrating "logic and information in interpretive semiotics" (Brier 2017d, p. 12) and by placing signs at the centre of the world (Brier 2018d, p. 103). Just so, what makes Brier's cybersemiotic approach so innovative is the insertion of qualia or Peircean qualisigns (like the sense of redness or sweetness) into a scientific communicational framework at the same ontological level as atoms, energy, statistical information and human language (Cannizzaro 2016, pp. 323–324). (On potential points of overlap between Peirce's phaneroscopy and Buddhist phenomenology see notes 5, 6 and 9 above.) Going beyond the protosemiotic level of "information" as a dualistic concept (Brier 2008, pp. 33–34), cybersemiotics follows the path taken by biosemiotics towards understanding information as being dependent upon semiosic processes of interpretation (Hoffmeyer 2003): biosemiotics has moved beyond definitions of information as a measurable quantity or indeed as "a piece of DNA" as suggested by the physicalistic reduction of living phenomena to an interaction of "purposeless forces" (pp. 2647–2649; Brier 2017d, p. 30). Moreover, in order to "heal the split between science and phenomenology" and thus the gap between the quantitative-scientific and the qualitative-humanistic types of knowledge (in the sense of C. P. Snow), Brier calls for an explicit inclusion of phenomenology and hermeneutics: for only by including the dimension of signification and meaning alongside the physical, biological, and social dimensions captured by the biological sciences, cybernetics and communication science, can we construct a truly transdisciplinary theory of information (Brier 2017d, pp. 17–21). Working from Peirce's pragmaticism, which combines a triadic "theory of logic-as-semiotic with an evolutionary theory of forms", we may conceive of the sign as a real, dynamic, and relational reasoning process that presents us with "a piece of information about the world" (pp. 26–29). In other words, the Peircean account of this "non-reducible triadic process relation" (Brier 2017d, p. 28) teaches us that humans partially create objects for themselves "out of Firstness through Secondness and Thirdness, which is not only 'out there' but also 'inside us.' Through *the triadic leap of semiosis* [...] our reality comes into being as signs" (Brier 2008, p. 334).

Thus, by permeating all levels of living systems, semio-logical reasoning processes allow us to create a transdisciplinary philosophical framework "by integrating the causal role of experience, spirituality and the meaning of cognitive and communicative processes across nature and culture" (Brier 2018e, p. 1; cf. Brier 2018b, c). Peirce's conception that signs possess a structure that is "common to all that lives" is in fact borne out by the realisation on the part of semioticians in the humanities and researchers in the life sciences (biologists and biosemioticians) that the patterns and habits of the natural world are shared by human sign use (and the evolutionary history of living organisms) (cf. Wheeler 2017, p. 10). Along the same lines, Peircean semiotics and cybersemiotics allow us to mediate between extreme views that assume either a completely random or an utterly deterministic evolution of the universe (Brier 2017c, 60ff. and Brier 2017d, p. 27). Through its synechistic and hylozoistic ontology (assuming a deep connection between matter and mind) as well as its tychistic integration of chance as a foundational element of his metaphysics, Peirce's theory of reality assumes a level of pure potentialities of quale-consciousness (i.e. Firstness): the latter manifest themselves in concrete phenomena like facts, force and will (i.e. Secondness) and through the tendency to take habits evolve into the reasonableness of regularities (i.e. Thirdness) (Brier 2017c, 63ff.).[41]

[41] This process view of an evolving universe comes close to the "modern theoretical idea of the quantum vacuum field that is never at rest" (Brier 2017a, p. 104): assuming "a level of pure potentialities", Peirce views "the basis of reality as a spontaneously generating field or force of possible existence of quale-consciousness" (Brier 2018c, p. 26). Moreover, the notion of primordial emptiness in Peirce (cf. e.g. Brier 2014) promises a number of parallels to explore with regard to similar

Thus, taking up Peirce's combined semiotic, phenomenological and cosmological view of humans within the universe (cf. Sheriff 1994), cybersemiotics presents us with an up-to-date approach on how to deal with the assumption of "a continuum between mind and matter, between the internal world of emotion, will, and thinking and the external world of matter, energy, and laws" (Brier 2008, p. 267): an approach that accords well with the non-reductionist view that Buddhism has to offer with its phenomenological description of "matter" and "mind" (Cho 2014; Lusthaus 2002; Lettner 2019a; Lettner 2021). With its aim to bring in Buddhist phenomenology, the transdisciplinary and intercultural project of a cybersemiotic philology of Buddhist knowledge forms ultimately deals with no less than the "relationship between biological semiotics and humanities semiotics", which is needed for a congruent theory of semiotics as such (Kull in Favareau et al. 2017, p. 17). At the same time, its conception is meant to contribute to the further development of the transdisciplinary framework of cybersemiotics itself: i.e. for "making emergence of mind probable and [a] transdisciplinary view of sciences possible" (Brier 2018a, p. 1). As suggested by "the symbol as a sign guided by habit in both human and nonhuman sign processes" (Nöth 2010, p. 91), exploring cybersemiotics from the perspective of Buddhist philosophy is going to involve the study of nature in culture (and vice versa) along the lines of Peirce's semiotic synechism.

Starting our "understanding of information with the process of knowing" (Brier 2017d, p. 27), let us now work out the basic coordinates of a cybersemiotic philology of Buddhist knowledge forms. Brier (2008, 131ff.) has described four major types of knowledge that in the human search for intersubjective foundations have crystallised in the form of qualitatively different, yet socially acceptable sciences. The respective methodological approaches are brought to bear upon four different types of systems forming the subject areas (here given in brackets): i.e. (1) physical and chemical sciences (physico-chemical systems of matter, energy, and differences); (2) life sciences (biological-autopoietic sign-producing systems); (3) phenomenology and psychology (organisationally closed thinking – feeling – volitional systems); and (4) linguistics, communication science, and social sciences (organisationally closed socio-communicative systems). While this model leads onto a transdisciplinary framework for the conception of knowledge (cf. Brier 2008, 137ff.;

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notions in Buddhism and (post-classical) science (cf. Ames 2003; Boaz 2016). In contrast to the mechanistic understanding of living beings implied by the knowledge forms of scientific modernity, Peirce manages to conceive of the laws of the universe in terms of an evolutionary growth of knowledge (cf. Brier 2017a + b). Important steps for creating an "alternative to the ontological postulate of eternal transcendental laws governing the mechanical materialist physicalist world view" have been taken by considering (thermodynamically open) systems in terms of dissipative structures (Prigogine and Stengers 1984) – their notion of order is comparable to Peirce's *law* as the product of habit (cf. Merrell 1999, p. 468) – as well as by the work done by Lee Smolin and John A. Wheeler (cf. Brier 2017b, p. 378). Moreover, through the notion of Firstness as "a state of absolute possibility and radical indeterminacy" (Brier 2017d, p. 29), Peirce's approach converges with insights of complexity theory and transdisciplinarity, yielding what Cilliers and Nicolescu have called "the *openness of the future*" (2012, p. 713): according to the new paradigm of self-organisation (cf. Brier 2008, p. 362), "Evolution is basically *open*" (Jantsch 1980, p. 184).

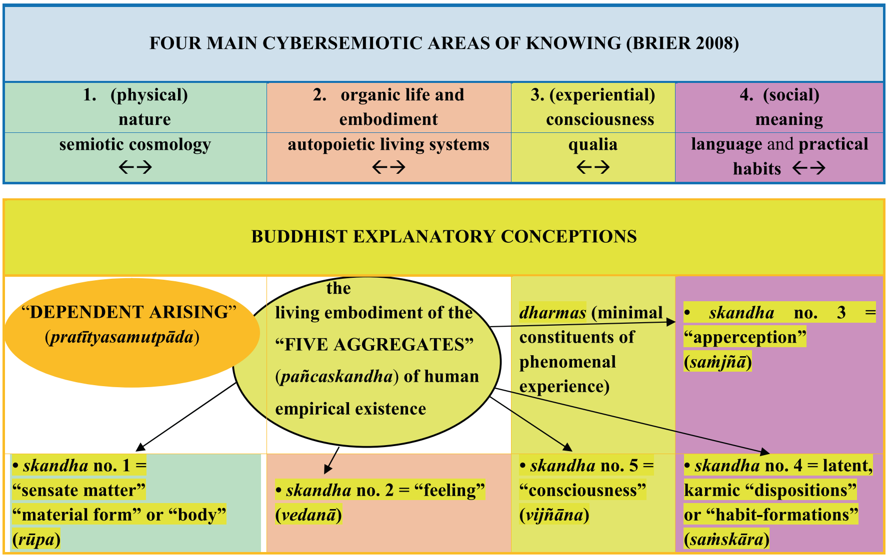

Fig. 13.12 Four main cybersemiotic areas of knowing and Buddhist explanatory conceptions Fig. 13.12 provides an overview of the rough correspondences between the four main cybersemiotic areas of knowing and the Buddhist explanatory conceptions of "dependent arising" (Skt. *pratītyasamutpāda*; Pā. *paṭiccasamuppāda*) and the "five aggregates" (Skt. *pañcaskandha*; Pā. *pañcakkhandha*) of human empirical existence. The five "aggregates", "heaps" or "groupings" (Skt. *skandha*; Pā. *khandha*) are (1) "material form" or "body" (*rūpa*), (2) "sensations" (*vedanā*), (3) "apperception" (*saṃjñā*), (4) "volitions" or "dispositional formations" (*saṃskāra*), and (5) "consciousness" (*vijñāna*) (Pā. terminology: *rūpa; vedanā; saññā; sankhāra; viññāṇa*). Both conceptions are going to be discussed in more detail as we come to deal with the various cybersemiotic areas one by one in the following passages. For a brief outline and a more comprehensive visual summary see Appendices I and II below

Thomsen and Brier 2014, pp. 51–52), the fourfold division underlying its conception actually arises from the "(cyber-)semiotic star" (cf. Brier 2008, p. 361) with its four areas of (1) physical nature ("energy"), (2) living systems/ embodiment ("life"), (3) an inner mental world ("consciousness"), and (4) social culture ("meaning") (see Fig. 13.12 below).

The four cybersemiotic areas of knowing, which have been summed up as (1) physical nature, (2) organic life and embodiment, (3) (experiential) consciousness, and (4) (social) meaning, have been placed into columns in order to highlight rough correspondences between their central conceptions of (1) semiotic cosmology, (2) autopoietic living systems, (3) qualia, (4) language and practical habits on the one hand and the features of the two Buddhist explanatory principles on the other hand. Brier (2008) has also spelled out their implications in a slightly different order that stresses the embodied nature of knowledge (as will be discussed with regard to area no. 2 below). This explanation tells us that human beings need to be considered as being (1) embodied and biologically situated, (2) conscious and intentionally situated, (3) meaning-situated in cultural practice and (4) environmentally situated "in a nature or a universe that is partly independent of our perception and being" (pp. 361–362). My hypothesis is that when comparing this outline to key assumptions of Buddhist philosophy we are going to find a number of overlaps with regard to such foundational issues as the question of how life and consciousness fit into a comprehensive framework of understanding. As a matter of fact, Brier's "cybersemiotic star", whose four points are meant to visualise "how the communicative social system of embodied minds' four main areas of knowledge arises" (Brier 2008, p. 361), is in itself evocative of the Buddhist interest in explaining how (our knowledge or fundamental misconception of) the world *arises*. Its focus upon the embodied nature of knowledge and its underlying phenomenological dimension can be captured well by the two Buddhist explanatory conceptions of "dependent arising" (*pratītyasamutpāda*) and the "five aggregates" (*pañcaskandha*), both of which are fundamental ways of classifying *dharmas* (to be discussed in a moment), and thus the phenomenology of experience. And they do so with regard to human embodiment, the five *skandhas* providing "an analysis of the components of personality in static form", while the formula of "dependent arising" (to be introduced in a moment) is meant to demonstrate "how such components dynamically interact to form the living provess of personality" (Harvey 2013, p. 67).

Considering that a phenomenological interpretation of Buddhism "reflects quite accurately Buddhist discourse itself" (Lusthaus 2002, p. 43), the cybersemiotic emphasis upon a phenomenological basis of its framework comes like a downright invitation to tackle these questions from a Buddhist perspective. The crucial concept in this respect are *dharmas*: as minimal constituents of phenomenological experience they can be considered as rough equivalents of the notion of qualia (see notes 5, 6 and 9 above). More precisely, "the *svalakṣaṇas* (particulars of color, smell, etc., or particulars of the inner experience – joy, pain, etc.)" as described in the tradition of the epistemologists Dignāga and Dharmakīrti may be treated as "'qualia' grasped by the primary, direct, preverbal, and pre-conceptual perception" (Lysenko 2017, p. 312). However, as William Waldron stresses in his Batesonian "Buddhist steps to an ecology of mind" (2002): the Abhidharma Buddhist notion of *dharmas* as momentary and distinctive "experiential events" provides us with a relational conception of experiential phenomena that is supposed to work within the context of a given system of analysis. In other words, the need to operate with "*a context of distinctions*" relativises "the notion that dharmas have any truly independent 'distinguishing characteristic' (AKBh *ad* I.2b; *svalakṣaṇa*)" (p. 11). As with the phenomenological foundations of cybersemiotics, the central significance of *dharmas* within the context of Buddhism can be seen from the fact that the distinctions between them are "constitutive of both perception and the entire system of knowledge based upon dharmas" (Waldron 2002, p. 12). The potential of applying Bateson's relational concept of meaning to Buddhist theories of consciousness and the cosmos also becomes clear with regard to the way in which the first cybersemiotic area of knowing, i.e. nature, is conceived according to Buddhism. The fundamental Buddhist principle of "dependent arising" (*Skt. pratītyasamutpāda; Pā. paṭiccasamuppāda*) can be roughly paraphrased as the "arising" (*utpāda*) "together" (*sam-*) "in dependence upon" (*pratītya*), which has been variously translated as "dependent origination" or "conditioned arising" (cf. e.g. Harvey 2013). It teaches us that all “conditioned phenomena” are dependent upon certain other phenomena. As can be seen from Appendix II below, the standard formula comprises the following twelve “conditioned and conditioning links” (*nidāna*): (1) “spiritual ignorance” (Pā. *avijjā*; Skt. *avidyā*); (2) “constructing activities” (Pā. *saṅkhāra*, Skt. *saṁskāra*); (3) “(discriminative) consciousness“ (Pā. *viññāṇa*, Skt. *vijñāna*); (4) “mind-and-body”/ “the sentient body” (*nāma-rūpa*); (5) “the six sensory bases” (*āyatana*); (6) “contact”/ “sensory stimulation” (Pā. *phassa*, Skt. *sparśa*); (7) “feeling” (*vedanā*); (8) “craving” (Pā. *taṇhā*; Skt. *tṛṣṇā*); (9) “grasping” (*upādāna*); (10) “becoming” (Pā. *bhava*; Skt. *bhāva*); (11) “birth” (*jāti*); (12) “ageing and death” and other *dukkha* [= Pā. “suffering”] states (sorrow, lamentation, pain, unhappiness and distress) (*jarā-maraṇa*) (cf. Harvey, 2013). More precisely, in order to explain how our sentient experience of phenomena comes about, this principle sets out the causal regularity or lawfulness of nature under which *dharmas* occur for constituting our experience (cf. Warder 1971, pp. 287–288).[42]

The fact that there are variations of the standard formula in the various scriptural presentations shows us that what matters is “the conditional relationship of these causal factors”, and “not the separate factors themselves” (Macy 1991, p. 37). Hence, this regulative principle offers itself well for providing a synergistic account of *Mutual causality in Buddhism and systems theory* (as the title of Macy’s study suggests). Parallels between the humanities and biosemiotics may be sought along similar lines with regard to the “processural, multi-causal, multiply interconnected” nature of both biological activity and semiosis more generally: such a convergence of modes includes “a recursivity of enacted, embodied, embedded and emergent (bottom up) and downwardly causal (top down) interaction” (Favareau in Favareau et al. 2017, p. 13). As for the study of living systems, this convergence points us towards possible synergies between systems biology and Buddhist philosophical approaches: for not only is biological functionality multi-level, but “systems with multiple levels and feedbacks downward and upward between the levels” do not possess any privileged level of causality (Noble 2016, pp. 242–245). For an in-depth discussion of the semiosic dynamics of “dependent arising” (*pratītyasamutpāda*) see Lettner (2020. 191ff).

As regards the first cybersemiotic area of knowing, i.e. (physical) nature, we can observe a close alignment between the “phenomenological naturalism” of Buddhist philosophy, dynamic systems theory as well as an enactive, embodied understanding of cognitive awareness (Coseru 2013): for cognition is not understood “as an internal state of mind or brain locked into linear causal chains of sensory input and behavioral output”, but rather as a sort of intentional “attunement to a world of

[42] “Dependent arising” does so on the basis of a theory of causality that is “neither solely simultaneous nor exclusively sequential”, but works as “a theory of concomitant conditionality” (Waldron 2003, p. 13): “When this exists, that comes to be; with the arising of this, that arises. When this does not exist, that does not come to be; with the cessation of this, that ceases” (*Majjhima-nikāya* = M II 32 as qutd. ibid.). Thus, the formula also describes how following the various conditions in reverse order leads to their ceasing, which in soteriological terms describes the path towards liberation (cf. Lettner 2020).

actions, objects, and meaning" (pp. 3–4). In fact, the "reciprocal hermeneutic" between early Buddhism and contemporary systems theory, i.e. a veritable "dharma of natural systems" (Macy 1991), also entails that "order is not imposed from above, by mind exerting its will on dumb material forces", but "it is intrinsic to the self-organizing nature of the phenomenal world itself" (p. xiii). Both interpretations of Buddhism align well with the "semiologic cosmology" and natural concept of meaning that cybersemiotics (Brier 2017a, p. 100) embraces with regard to Peirce's understanding of evolution as a sort of "living reasoning process": i.e. the view "that the universe is a vast representamen, a great symbol of God's purpose, working out its conclusions in living realities" (*CP* 5.119).[43] Some of the implications of "Structuring nature in Buddhism" have been worked out with regard to "The biosemiotic thrust of Buddhist phenomenology" (cf. Lettner 2019b). As a result of the broad, cosmological conception of consciousness in both Peirce and Buddhism, the first area of knowing, i.e. a semiotically conceived, meaningful "nature" or universe, already involves the dimension of consciousness (to be discussed as the third area of knowing in a moment).

Before turning to discuss the second cybersemiotic area of knowing, i.e. organic life and embodiment, let us take a look again at the first area or "world" and its definition: "The physico-chemical part of the natural world that also constitutes the pure material energetic aspect of our body" (Thomsen and Brier 2014, p. 50). We actually find a very similar overlap between the materiality of the world and the matter that constitutes human embodiment in Buddhist philosophy. We have already encountered "matter" (*rūpa*) as part of the "five aggregates" (*pañcaskandha*), whose conception of empirical personality is roughly equivalent to the "mentality-materiality" of *nāma-rūpa* (see Appendices I and II below). As with physical nature, *rūpa* is understood to comprise both the "physical elements of a personality" and the "external objects" of the outer world (Stcherbatsky 1923, p. 7). However, according to the Buddhist stance, "matter" (*rūpa*) is conceived as "sensate stuff" or "sensorial materiality" rather than as something dead and inert (cf. Lusthaus 2002, p. 64; Gethin 1986; Coseru 2012, *SEP* no. 2.1). As a result, the Buddhist category of *rūpa*, which translates as both "material shape" and "body", appears to merge with or in any case be equally close to the second cybersemiotic area of knowing, i.e. "Our embodiedness as the source of life, which we share with other living species" (Thomsen and Brier 2014, p. 50).[44] The cybersemiotic attention towards humans as biological

[43] Buddhist soteriology tends towards a "semiotics of signlessness" (cf. D'Amato 2003), which in semiotic terms can be tentatively modelled by means of "thought forms of signlessness" (Lettner 2020). In other words, the cessation of sign production parallels a wish to escape saṁsāric "wandering about" in an endless round of rebirths, which also has important implications for the logic of knowledge to be effected through the removal of (spiritual) ignorance. This would need to be compared with Peirce's assumption that a reasonable universe is developing towards its gradual perfection through the growth of knowledge by working out in more detail the semiotic cosmologies implied by Buddhism and Peirce's 'universe perfused with signs'.

[44] The phenomenological dimension of matter as well as the correlation of inner and outer spheres can also be seen from the theory of the "sensory bases" (*āyatana*): here, the so-called "external base" (*bāhya-āyatana*) e.g. of a visual "object", i.e. "colour or shape" (*rūpa*), gives rise to "(visual)

beings (cf. Brier 2008, p. 230) can be seen from the reliance upon the biology of cognition developed by Humberto Maturana and Francisco Varela (1980). Through the establishment of "structural couplings", "there is no 'inside' or 'outside' for the nervous system, but only a maintenance of correlations that are constantly changing" in the sense that the "repetitions of sensori-motor correlation patterns are conserved as part of the structural dynamics of the network" (Brier 2008, pp. 88–89). In his elaborate study on Buddhism and the sciences, Jeremy Hayward (1987) also emphasises that "perception arises within the whole field which a third-party observer divides into organism and environment; perception is not initiated purely from within the organism" (p. 149). Moreover, in keeping with such a view of perception, Buddhists do not treat the senses as the faculties of an internal agent, but rather consider them "as instruments or mediums joining together the external spheres of sensory activity with the internal spheres of perception" (cf. Coseru 2012, SEP, no. 3.2). Thus, reading Buddhist thought in terms of evolutionary biology (Waldron 2002), we may say that the series of "dependent arising" (*pratītyasamutpāda*) depicts a recursively cyclic process between the "karmic formations" or "constructed complexes" (*saṁskāra*, Skt. pl. *saṁskārā*), "cognitive awareness" (*vijñāna*), and the constructing afflicted actions that are both enabled by the former two factors and endowed with a constructing power themselves: all this leading to a "causal reciprocity between cognition and structure" that is typical of a living system (cf. pp. 15–19). In fact, such dynamics accord well with the cybersemiotic integration of Gregory Bateson's evolutionary and "ecological cybernetic concept of mind" and its further development in order to also "encompass meaning in the hermeneutic understanding and phenomenological experience of embodied living and social systems" (Brier 2017d, p. 13). The way in which the various aspects of living embodiment, structural coupling and cognition intertwine in the sense of practical habits according to the Buddhist point of view has been summed up by Lusthaus (2002) with regard to how "dependent arising" (*pratītyasamutpāda*) works in the "forward" (*anuloma*) mode of conditioning:

> Embodied conditioning (*saṃskāra*) continues to en-act and unfurl due to the absence of some basic insight (*avidyā*). Hence cognizance (*vijñāna*) arises as a lived body (*nāma-rūpa*) bursting with sensorial capacity (*āyatana*). At this stage, the circuits between organs and objects that result in the sensory consciousness constitute a kind of 'intentional arc' [i.e. in the sense of Merleau-Ponty]. (p. 59).

Some of the synergies between Buddhist "sensorial materiality" (*rūpa*) and Merleau-Ponty's phenomenology of perception (cf. Lusthaus 2002, 30ff) as well as his ontology of "flesh" will be explored in terms of a Buddhist phenomenological prelude and view on wholeness (including some thoughts on cybersemiotics) (cf. Lettner (forthcoming-e). We are going to look more closely into the intertwining between living embodiment and the "meaning" dimension of language and practical habits

awareness" when occurring together with the corresponding "internal base" (*adhyātma-āyatana*), which in this case would be the visual faculty. For an outline of this classificatory scheme see Lettner (2020. p. 196; pp. 210–211). For a brief discussion of the phenomenological implications of "sensate matter" (*rūpa*) with regard to embodied experience see Lettner (2021, pp. 56–57).

when dealing with the fourth cybersemiotic area of knowing (in a moment). Summing up the second area of knowing, we may say that according to Brier (2017d) "the aware body" constitutes "a complex multidimensional object of research", and as such it necessitates a whole range of transdisciplinary efforts: i.e. approaches that enable us to take into account human cultural history with regard to the evolutionary process of human biological existence and its "range of perceptions, experiences, desires and imaginations" (p. 17). Tackling the matter in Buddhist semiotic terms would in fact profit from a more detailed investigation of the way in which "karmic formations" (*saṁskāra*) of body, speech, and mind determine "habitual predilections and volitions" (*cetanā*) (cf. Lusthaus 2002; Waldron 2002) with regard to "life forms", which can be seen to comprise "forms of living embodiment", "language forms", and "thought forms" (in a narrow sense). (On the practical overlap between mentefacts and the linguistic constitution of objects by means of concepts see Sect. 13.7 below). Setting out to cybersemiotically explore "thought forms" (in a broad, encompassing sense) with regard to the "body-endowed-with-consciousness" (Pā. *saviññāṇaka kāya*) of the (early) Buddhist tradition (cf. Gethin 1986, p. 36) we may thus respond to the interest that cybersemiotics takes in "the situated living body" and its meaning-making processes (cf. Brier 2017d).

Let us now turn to the third cybersemiotic area of knowing, which is consciousness. What makes Peirce's conception of semiotics as logic so suitable a basis for developing a framework for the reconstruction of Buddhist knowledge forms is its comprehensive outlook and its phenomenological grounding. While Peirce conceives logic (in its broader sense) as "the science of the necessary laws of thought" with regard to the "general conditions of signs being signs" (*CP* 1.444), the attention he pays to "the laws of the *evolution* of thought" (ibid., my emph.) reveals a broad conception of consciousness that is not limited to the workings of the human mind: rather, we are dealing with "a phenomenon that develops in nature to emerge in new and more structured forms in living beings, nervous systems, and language-based culture" (Brier 2008, pp. 372–373; cf. a. Sheriff 1994). Choosing to "reduce all kinds of mental action to one general type" (*CP* 5.266), Peirce thus paves the way for a (cyber-) semiotics of thought forms that allows us to include a "logic of the universe": and we can do so by bringing a combined consideration of logical, ontological, psychological, and cosmological dimensions to bear upon Buddhist theories of consciousness and explanations of the universe (cf. Lettner 2019a), notably the fundamental principle of "co-dependent arising" (*pratītyasamutpāda*). In fact, the notion "that all this universe is perfused with signs" (*CP* 5.448) points to the existence of the human being "in an evolutionary universe with an inherent tendency to habit formation" where this fundamental agency of taking habits turns out as being eqivalent to the "law of mind" (Sørensen et al. 2018, pp. 9–11). In this respect, Peirce's model of semiosis can be shown to adapt itself better than e.g. Ernst Cassirer's cultural-semiotic approach to both a semiotic reading of Buddhist philosophy and for accomplishing the envisaged step of bringing a cybersemiotic interpretation to bear upon natural and cultural forms of life.

It is in fact the fourth cybersemiotic area of knowing that may provide us with the foundations and a starting point for looking into Cassirer's conception of "symbolic forms" in order to then develop a more comprehensive semiotic model of natural and cultural "life forms" on the basis of Peirce's semiotics as logic. The fourth area concerns the way in which meaning manifests itself socially in the form of language and practical habits. What in the Buddhist context is central to such an investigation is the conception of the so-called "karmic formations" (*saṁskāra*), which constitute the fourth "aggregate" (*skandha*) of empirical personality as well as the second "link" (*nidāna*) of "dependent arising" (as set out in Appendices I and II below). More precisely, the saṁskāras take into account the production of meaning with regard to "mind" (*citta*), "speech" (*vacī*) and "body" (*kāya*) (Pā. terminology). The term *kāya* refers to a psycho-physical organism or a "phenomenal body" (cf. Lusthaus 2002, p. 54), as is also implied by "link" no. 4, i.e. "name-and-form" (*nāma-rūpa*), which is roughly equivalent to the five *skandhas*. In Buddhist phenomenological terms we may say that desire or an intention to engage with worldly affairs becomes embodied in the sense of "life forms" or "forms of living embodiment", i.e. in the very sense that organs like ears constitute nothing less than "embodiments of an intentionality to hear" (cf. Lusthaus, ibid.). It is the resulting "linguistic-cognitive web of closure" (loc.cit., p. 61) that in cybersemiotic terms can be explained with regard to "our bio-psycho-socio-linguistic conscious being" (Brier 2008, p. 394): i.e. with regard to the organisationally closed socio-communicative systems of the fourth area or the "cultural world of language, meaning, power, and technology" (loc.cit. p. 131; Thomsen & Brier 2014; p. 50). The fact that "[l]anguage, pragmatically conceived, connects our perception with our thinking, communication, and acting in the social world" (ibid.) can in turn be captured by the above-mentioned conception of "mentality-materiality" (*nāma-rūpa*), which implies not only the four *nāmic* (i.e. nominal) or mental "aggregates" (*skandhas*), but "the entire psycholinguistic sphere" (Lusthaus 2002, p. 54), referring us back to what in cybersemiotic terms has been described with regard to the equally closed phenomenological or psychic system. What is also significant in this respect is the third skandha of "apperception" (*saṁjñā*) (to be briefly discussed in section 13.7 below), which implies a linguistically mediated perception and interpretation of something *as* something and as such is determined by habit (cf. Lettner forthcoming-b). For an attempt to model "thought forms" on Buddhist notions of linguistic and conceptual construction with regard to the key term *prajñapti* ("concept") see Lettner (2020, pp. 202–203). A discussion of *prajñapti* with regard to the question of how mentefacts are related to the linguistic creation of objects will be offered in section 13.7 below.

13.5 From Cassirer's "Symbolic Forms" of Culture to Peirce's Semiotics as Logic

In the first volume of *The philosophy of symbolic forms* of 1929 (Tr. 1955), Ernst Cassirer famously pronounces the step he intends to take with regard to the Kantian legacy: "the critique of reason becomes the critique of culture" (p. 80). In so doing he is guided by an interest in the law that determines the structure of such "particular forms of culture" as language, art, myth, religion, and scientific cognition: a law that is to be abstracted from the phenomena themselves. It is the directions that the human spirit takes that are meant to provide the basis for defining the various cultural forms through "a kind of grammar of the symbolic function as such" (1955, p. 86). What this understanding of knowledge as a function of human life boils down to in cultural philosophy is the thesis that culture is essentially constituted through (human) agency: cultural forms come as the result of human collective self-determination (cf. Schwarz 2018, p. 264). In view of this, "the symbol is the 'essence of man' and of human culture", as Nöth (2010, p. 84) explains the gist of Cassirer's conception. The notion of human spirit thus remains central with Cassirer, but not so with Peirce. While even according to Peirce, the "symbol, by the very definition of it, has an interpretant in view" (*EP* 2, p. 308), "an interpreter's mind is only the vehicle in which the purpose of the symbol becomes embodied", but the purpose is "not determined by the minds of the symbol users and their intentionality" (Nöth 2010, p. 86).

An important aspect implied by Peirce's "semiotic transformation of transcendental logic" as reconstructed by Apel (1973) is the fact that Kant's notion of an objective unity of representations ("Vorstellungen") for a self-consciousness is replaced by Peirce's category of thirdness and the concept of the interpretant (cf. p. 167). While for Kant it is the "schema" that allows for the pure concepts of the understanding to be applied to objects of sensibility, the way in which Peirce manages to bring "the impressions into a unity" is "through the mediative character of representation" (Ormiston 1977, p. 216). Because of the difficulties implied by "picture theories" of reality associated with the mentalistic paradigm, assumptions of a direct correspondence between grammar and ontology, between "logical form" and reality have given way to usage-based theories of meaning (cf. Schönrich 1981, p. 118). In contrast to a "transcendental semiotics" along the lines of Kant, Peirce's theory of thought signs has led to a replacement of the "static 'ideas' of traditional idealism" by "dynamic signs" (Bergman 2010, p. 3). According to the Peircean model, agency is located within the process of signification itself [45]. Through its

[45] With Peirce, "the philosophy of mind is thus reduced to semiotic. In order for this to go through, though, it is essential that the conception of mind as something apart from this process not be surreptitiously reintroduced by construing the interpretation of a representation as an interpreting act by a mind independent of the process, which is to say that the agency of interpretation must be located in the process itself. In other words, that which generates the interpretant is not a mind which is interpreting the representation but is rather the representation itself: thus semiosis is defined by Peirce as the action of the representation (sign) in generating its own interpretant.

process-philosophical and non-psychological conception, the model Peirce's approach is broad enough to also explain processes of non-human agency, including the psycho-ontological conception of the universe and of consciousness in Buddhist theories, the notion of an unconscious as well as various biosemiotic forms of communication, all of which we intend to accommodate within a comprehensive model of natural and cultural life forms.

More precisely, it is the move of semiotics to disengage from the subject as the sign-producing authority and to operate with the notion of "code" rather than "spirit": in contrast to the traditional, subject-centred perspective of hermeneutics, such a move harbours a great potential of going beyond Eurocentric approaches when analysing signs and texts (cf. Assmann 1997, p. 727). At least since Jakob von Uexküll's theories have made clear the situatedness of humans within a semiotic *umwelt*, "a revision of the anthropocentric position is on the semiotic agenda" (Nöth 2010, p. 87). Such a revision will be attempted by further developing both the process-philosophical and non-Eurocentric potential of Peirce's broad conception of consciousness[46] and, in line with this, his comprehensive conception of the sign.[47] To start with, Peirce's understanding of sign processes, which views sign users as being only "co-agents in the process of semiosis" (Nöth 2010, p. 88), lends itself well to modelling the Buddhist notion of "no self". While the traditional philosophical notion of a unified self perpetuates religious assumptions of a substantial soul (as in the ancient Indian philosophy of the Upaniṣads, with its notion of *ātman* as "spiritual self"), Buddhism comes close to the Freudian notion of the unconscious, which implies that the self is decentred, non-autonomous, and non-eternal (Adam 2006, p. 50).[48] In a similar vein, Peirce understands processes of semiosis as being "autonomous or self-governing" in the sense of an immanent principle (cf. Ransdell 1992, no. 6) and teaches us "that the subject is determined by signifiers rather than

Semiosis is not a mental act of interpretation" (Ransdell 2017, p. 77). As Stcherbatsky (1923) puts it with regard to Buddhism as set out in the *Abhidharmakośa* (*-bhāṣyam*) (cf. *AKBh* 1988): with consciousness "there is nothing that does cognize, apart from the evanescent flashings of consciousness itself" (p. 58). I intend to further explore related Buddhist theories in light of Peirce's conception of semiosis and the question of agency in a paper on "A Buddhist model of semiosis? Perception in 'the sign of three': sense, object and consciousness".

[46] In setting out the "simple thing" of consciousness, Peirce reminds the reader, "Only take care not to make the blunder of supposing that Self-consciousness is meant". For "consciousness" is to be regarded as "nothing but Feeling, in general", i.e. "the immediate element of experience generalized to its utmost" (*CP* 7.365).

[47] Thus, while Cassirer still operates with a "sensibility governed by the spirit" (cf. 1955, pp. 86–87), Peirce famously declares that "Thought is not necessarily connected with a brain. It appears in the work of bees, of crystals, and throughout the purely physical world; [...] Not only is thought in the organic world, but it develops there. But as there cannot be a General without Instances embodying it, so there cannot be thought without Signs. We must here give "Sign" a very wide sense, no doubt... (*CP* 4.551).

[48] In this statement one can almost hear an echo of the fundamental Buddhist principle of the "three marks" (Pā. *tilakkhaṇa*), according to which all conditioned phenomena are "impermanent" (*anicca*), "painful" (*dukkha*), and "non-self" (*anattā*) (cf. e.g. Conze 1962, 34ff.).

being a transcendental producer of them", as Silverman (1983) explains in her psychoanalytically informed study on *The subject of semiotics* (p. 18).

Since Peirce is "not speaking of Soul, the metaphysical substratum of Mind (if it has any), but of Mind phenomenally understood" (*CP* 7.365), the notion of consciousness lends itself well to a semiotic reading of Buddhist theories of consciousness. Just as Peirce's semiotics does not operate with a transcendental subject (Brier 2017c, p. 57), Dignāga refuses to "make 'conceptual construction' a transcendental activity"; and he refuses to do so for soteriological reasons "because that would leave the human person without any control over an activity which, according to the Buddha, leads either to bondage or to freedom" (Kalupahana 1992, p. 198).[49] In deep-structural terms, the Peircean approach aligns well with the "individual soteriological task" or "nirvanic programme" of Buddhism, which "consists in depersonalizing this experience and transforming oneself into 'nobody' or, in Buddhist terms, to treat his or her own mental states as impersonal, anonymous dharmas" (Lysenko 2017, p. 307). In Abhidharmic philosophy, "there is no psychology here" when observing a person with regard to the "rise of a thought" (*cittuppāda*) as theorised in the first book of the Theravāda *Abhidhamma-piṭaka* (Buswell and Jaini 1996, p. 91), the *Dhammasaṅgaṇi* (cf. Piatigorsky 1984, pp. 65–66). More precisely, what happens in such a process of depersonalisation is that "a person overcomes her feeling of 'mineness' with regard to her own mental states and their objects, as if she were a detached observer" (Lysenko 2017, p. 307): a view that is interesting with regard to Maturana's notion that "[t]here are no autopoietic systems without an observer to 'bring them forth'" (Brier 2008, p. 180). Within the context of Buddhist meditational practice (Harvey 1986), the role of a detached observer implies a sort observation that observes without grasping stimuli as signs being indicative of something else – or to put it in Peircean terms: as something "by knowing which we know something more" (*CP* 8.332). We could describe the consequences of meditative insight by saying "that the projecting process knows itself, that is all, there is nothing behind it whatsoever, no atomic minds and no 'unknowable things in themselves' (Hayward 1987, p. 146). In other words, rather than treating the "I" and "things in themselves" as the primary facts, the two arise together and "are thus mutually fabricating in a reciprocal process" of projecting in which neither is primary or has any existence beyond the projecting process itself (ibid.). In a very similar way, Peirce's synechistic ontology (*CP* 6.590) assumes a continuity between matter and mind, between the inward and the outward worlds and thus also between the subjective and the objective realms. Thanks to its phenomenological grounding, Peirce's philosophical conception of three categories also provides us with the basic components from which to build a relational and dynamic logic of

[49] More precisely, in order to understand why there cannot be any pure percepts (cf. Kalupahana 1992, p. 71), we would need to take a closer look at the functioning of "karmic formations" or "dispositions" (Pā. *sankhāra*; Skt. *saṁskāra*) of body, speech, and mind (e.g. Waldron 2003, 13ff.). (Also see the brief discussion of *saṁskāras* provided with regard to Appendices 1 + 2 below.)

symbols rather than starting with things or (semiotic) objects.[50] Along these lines, Peirce's notion of the quasi-mind helps us to "de-substantialise" the process of signification, which is not necessarily carried out by a human (conscious) mind: an aspect that makes the Peircean model well compatible with the non-psychological conception of consciousness in (Abhidharma) Buddhist approaches (cf. Lettner, 2021). Hence, if knowledge forms "unfold from our bio-psycho-socio-linguistic conscious being" (Brier 2008, p. 394), including unconscious processes (cf. e.g. 307ff.; p. 395), the crucial question to ask is: just what do we mean when speaking of such an embodied and more or less conscious being in Buddhism? That is to say, how frame an "experiential mind's agency" (cf. Brier 2018f, p. 22) with regard to the Buddhist notion of "no self" (*anātman*) as it is implied by the fourth "link" (*nidāna*) of "dependent arising": i.e. *nāma-rūpa* ("name and form"), which refers to a "lived-body" in the sense of "a linguistically-complex conscious body" (cf. Lusthaus 2002, p. 59)?

13.6 "No Self": Semiosic Agency of a Living System in Buddhism

According to the approach of cultural semiotics sketched above, individuals, societies or groups of individuals may act as individual or collective sign users (cf. Posner 1989, 2004). Posner's pun that individuals – indeed in the etymological sense of "undividables" – "function as users of conventional signs, and they lose this ability when they are divided into pieces" (2004, p. 12), is interesting from a Buddhist perspective. We have already looked at the notion of ontological primitives as opposed to the example of a water-jug that can be broken into pieces (in note 37 above). Thus, it is precisely the "non-ultimacy" in analytical terms of (merely "nominally existent") *prajñaptisat* entities that in the Sarvāstivāda ontology (and theory of two truths: conventional vs. ultimate) distinguishes ordinary objects like a pot or a person (i.e. a "dependent linguistic and cognitive referent" designated by conventional names) from what by means of analysis is found to be ultimate: i.e. "the *dharmic* list which included all ultimate existents" (cf. Williams 1980, p. 2). (In fact, the way in which Buddhism looks at objects of conceptual and linguistic construction as being only "nominally existent" (*prajñaptisat*) seems to come very close to the notion of "mentefacts" as discussed towards the end of Sect. 13.7 below). The famous dialogue "Questions of King Milinda" (*Milindapañha*), which purports to record a conversation between the Indo-Greek king Ménandros I (ca. 150 BCE) and the Buddhist monk Nāgasena, is well-known for Nāgāsena's example of the chariot, which he deconstructs in a nominalist fashion and in keeping with the notion that an "individual" (Pā. *satto*) exists only as "a denomination" (*sankhā*), an "appellation"

[50] My thanks go to Søren Brier for his mail exchange of October 23, 2018, which has helped me to see this point more clearly.

(*samaññā*), a "concept" (*paññatti*), a "designation" (*vohara*), "nothing but a label" (*nāmamattam*) (cf. Hayes 1988, 86ff; Coseru 2012, *SEP* no. 6.3); the reference to (parts of) one's body and/or mind is constantly shifting, and as such the vague notion of person or self actually applies to the "five aggregates" (Pā. *pañcakkhandha*), which are adduced for explaining human empirical personality (as discussed with regard to Fig. 13.12 above). In fact, the Buddhist doctrine of "no-self" (Skt. *anātman*; Pā. *anattā*) has important consequences for the understanding of consciousness and thus also for the conception of sign processes. According to the Buddhist view of sentient existence, cognitive awareness is not construed "as the activity of an abiding self" (cf. Coseru 2012): rather, human personality is temporarily made up by a heap of five "aggregates" (Skt. *skandha; Pā. khandha*) that are more like the snapshot of a dynamically evolving conglomeration. This sort of "psycho-physical continuum" (loc.cit. no. 3.2), which overlaps with the "causal continuum of interdependently arising phenomena" (*pratītyasamutpāda*) (also discussed following Fig. 13.12 above and set out in the Appendix), explains human existence without assuming any substrate or permanent essence. Importantly, what is eliminated through the workings of dependent arising (cf. Kalupahana 1992, p. 32) is just this: the notion of a permanent and unified self that may function as the agent of semiotic or semiosic processes.[51] Naturally, the refusal to accept a permanent self raises a number of significant issues with regard to what (empirical) personhood and (impersonal) agency come to mean within the context of Buddhist ethics (cf. Lettner forthcoming-f): here the possibility of free will and moral responsibility seems to be the number one question asked by Western scholars.

As a result, the conglomerate of five psycho-physical processes in Buddhism does not constitute an individual in the above-mentioned sense, i.e. the Western notion of individual personality, which can be traced back to Aristotle's conception of substance and formal unity.[52] By contrast, because of its refusal of permanent substances, the Buddhist view seems to amount to the very option declined by Aristotle, i.e. of giving preference to the more basic entities. In the context of Buddhist

[51] What Peirce calls "semiotic" is "the doctrine of the essential nature and fundamental varieties of possible semiosis" (*CP* 5.488) so that in its final effects the just-mentioned distinction could be seen to collapse. However, when embarking upon more detailed analyses we would do good to follow De Tienne (2013) in using "the adjective 'semiosic' to refer to the sign process Peirce called semiosis, and the adjective 'semiotic' to refer to the science of semeiotic or semiotics either as such, or as the standpoint from which a characterization is made" (p. 34)

[52] According to Aristotle's categories and metaphysics, an individual human being constitutes a primary substance (*οὐσία*). What is in its nature "individual" (lit. "indivisible", *átomon*, cf. *Categ.* II, 1b: *τὰ ἄτομα*) and "numerically one" (*ἓν ἀριθμῷ*) is not said of any subject (cf. Aristotle, Tr. Cooke, 1938). This characterisation of substance (*οὐσία*) in terms of "some concrete this" (τόδε τι) is meant to highlight the formal self-unity of some substantial being in the sense in which substance is understood to remain identical with itself even in the very face of change (cf. Vollrath 1978, pp. 104–105). What matters to Aristotle's understanding of an organism like a human being is precisely the specific configuration that the various constituents assume: "Only if we give the organization this kind of priority over its constituents will it count as an essence" (Frede 1992). However, Aristotle "does not want these to be mere configurations of more basic entities, such that the real things turn out to be these more basic entities" (loc. cit.).

philosophy, those more basic organisational entities are the minimal constituents of experience called *dharmas*, which are grouped into the five *skandhas* ("aggregates") that make up (human) empirical existence. (See the discussion of *dharmas* and "uniquely defining characteristics" (*svalakṣaṇa*) as ontological primitives in Sect. 13.3 above). The configuration of *dharmas* into entities like "subjects" and "objects" is considered as transitory and regulated in keeping with the *dharmic* flux and semiosic dynamics of "dependent arising" (cf. Lettner 2020, 191ff.). While the Buddhist conception of the human being in terms of five aggregates would be interesting to explore along Peircean lines as "a bundle of habits" (*CP* 6.228; cf. a. Pape 1989, 45ff.; Singer 1980, 494ff.; Sørensen et al. 2018), Buddhism does not assume any "unity of self-consciousness" to "be given as a centre for the habits" (*CP* 6.228). However, according to the Buddhist view, "we are all bundles of such habitual predilections" as determined by the embodied conditioning of "karmic latencies" (Skt. pl. *saṁskārā*) (Lusthaus 2002, pp. 48–49). As latent dispositions including embodied "habits" like unconscious processes and more concrete evolutionary products like the sense organs (or faculties), the latter are in fact "the psycho-physiological structures", including the sense organs or faculties, that have been built up by previous (evolutionary and) karmic activities (Waldron 2002, p. 19). Against this background, the decisive question to ask is: how are we going to deal with the Buddhist challenge of "no-self" with regard to the question of agency in semiotic terms? In other words: when trying to expand the notion of cultural forms as defined within the context of cultural semiotics and philosophy, what steps will need to be taken to arrive at a more comprehensive notion of life forms that goes beyond the narrow concerns of human (conscious) sign production? The answer to such a project can be formulated with regard to *The cultural implications of biosemiotics* (Cobley 2016) and the maxim that "Semiotics' levelling of the cultural playing field [...] to investigate semiosis "across all realms of life reaches its full fruition in biosemiotics" (p. xiii). Taking up the biosemiotic aim "to explain how life evolves through all varieties of forms of communication and signification (including the cellular adaptive behavior, animal communication, and human intellect)" (Kull et al. 2011, p. 25), the challenge is to conceptualise semiosic agency in such a way as to allow for a comprehensive conception of life forms to be taken as the basis for a cybersemiotic philology of (Buddhist) knowledge forms.

We can accomplish such a broadening of focus towards a more comprehensive notion of life forms with regard to their continuity in both nature and culture by working with the notion of a "living system" (see Vidales, Ch. 3 in this book: in particular 38ff. and 46ff. on Brier's integration of the semiotic and the informational paradigms) rather than with the traditional concept of "subject" or human spirit when dealing with the agent involved in semiotic or indeed semiosic processes (see note 51). Let us see what this means for the problem that poses itself as "the problem of the 'somebody' (i.e. the living system as a subject which receives and decodes signs" (loc.cit., p. 547) when tackled for the development of a Buddhist cybersemiotics and biosemiotics. Within the context of their biology of cognition, Maturana and Varela (1980) have coined the term autopoiesis (i.e.

"self-production", formed on the basis of Greek *αὐτός* "self" and *ποίησις* "making, doing, creation") for referring to "what takes place in the dynamics of the autonomy proper to living systems" (p. xvii). In fact, in a radical sense, "even the single cell has its semiotic self or its 'Ego-Ton'" (T. v. Uexküll 1992, p. 457). Considering the central role of symbols in self-production, reproduction and evolution, arguably, understanding processes of organisation at a cellular, organismic and social level is crucial to understanding biological organisation – and thus "the organization of living things" (Cariani 1998, p. 11). In the present context we can only hint at the manifold synergies between Buddhism and cognitive science, including evolutionary biology (Waldron 2002) as well as systems theory (Macy 1991), and draw attention to the fact that the fundamental notion of "karmic formations" (Skt. pl. *saṁskārā*) also includes evolutionary inheritances (Lusthaus 2002, p. 53). We cannot discuss in any detail the cybersemiotic integration of biosemiotics with Luhmann's approach as accomplished by Brier (2008, 392ff.[53]; however, see Vidales, Ch. 3 in this book, 62ff.). Let us now take a look at what levels in cybersemiotics can be adduced for explaining phenomena within the realms of both nature and culture, i.e.: 1. the languaging of biological systems at a reflexive signal level, 2. the motivation-driven sign games of psychological systems, and 3. the language games level of the self-conscious linguistic human in a social-communicative system (cf. p. 395; cf. note 58 below; see also Vidales, Ch. 3, pp. 63–64). The notion that meanings correspond to biological needs of the system is central to the functional cycle devised by Jakob von Uexküll (cf. T. v. Uexküll 1992, p. 460)[54] (see Fig. 13.13 below).

In fact, the way in which Uspenskij (1991) describes the functioning of a code within a particular social and historical context is very similar to this model. According to Uspenskij, the code that provides coherence for the social dimension (i.e. the socium as a collective person) organises information in such a way as to determine the selection of significant facts as well as the relations between them: "what is not described in this 'language' is not even perceived by the social receiver,

[53] According to the scheme that Niklas Luhmann has developed for a general description of self-referential autopoietic systems, we can distinguish between living systems (cells, brains, organisms, etc.), psychic systems, and social systems (societies, organisations, interactions) (Luhmann 1990, p. 2). Arguably, such an approach can be mapped onto the semiotic view of culture as a sign system consisting of social, material, and mental domains (Posner 1992, 2004) (as discussed with regard to Fig. 13.8 above).

[54] In *The theory of meaning* of 1940, Uexküll (tr. 1982) explains: "Everything that falls under the spell of an Umwelt (subjective universe) is altered and reshaped until it has become a useful meaning-carrier; otherwise it is totally neglected" (p. 31). "Only a fraction of the outside world is picked up through the sense organs of animals and treated as stimuli, which are then transformed into nerve-impulses and conducted to the central perceptual organs. Perceptual signs then arise in these perceptual organs and are projected as perceptual cues to become properties of the meaning-carriers", i.e. what is called the "object" (pp. 33–34). More precisely, the latter "serves as an undifferentiated objective connecting structure (*Gegengefüge*) whose function is only to connect the perpetual cue-carrying parts with the effector cue-carrying parts" (p. 33). Thus, the functional cycle demonstrates "how the subject and the object are dovetailed into one another to constitute a systematic whole" (Uexküll, 1957 as qutd. by Brier 2008, p. 317).

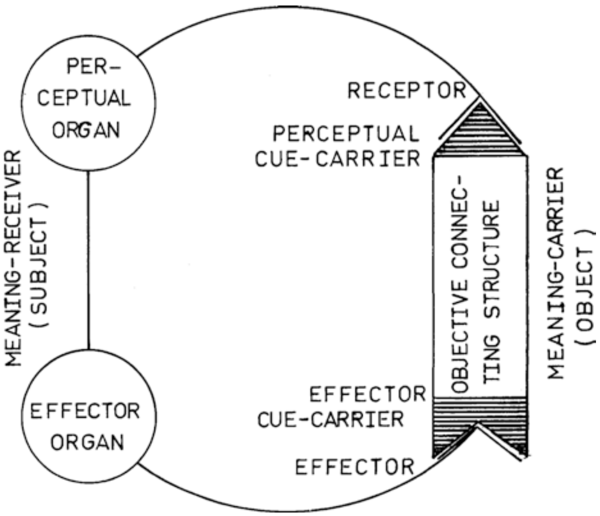

Fig. 13.13 Jakob von Uexküll's functional cycle
Figure 13.13. Jakob von Uexküll's functional cycle (repr. of Fig. 13.1 in Uexküll 1982, p. 32) illustrates how *Umwelten* constitute subjective realities in the sense that things existing (objectively) in the environment are transformed into perceptual cues invested with a functional tone, which "alone makes them into real objects" (Uexküll 1957 as qutd. in Brier 2008, p. 315). The meaning assigned to some phenomenon through its encoding into a sign is then utilised through behavioural activity through "effectors": an activity that for its realisation needs "the help of a matching counter-activity of the environment" (T. v. Uexküll 1992, pp. 458–459)

it lies beyond his field of vision" (p. 7, my trans.). Just so, biological functions are contextual, as Kalevi Kull, Terrence Deacon, Claus Emmeche, Jesper Hoffmeyer and Frederik Stjernfelt point out in their "Theses on biosemiotics" (2011): "Life is historical in the sense that its continuation depends on an ability to learn", a principle which also applies to natural selection as "a kind of learning process" in the sense of its "remembering the fit and forgetting the unfit" (pp. 46–48). Importantly, not only can the semiosic/non-semiosic distinction be regarded as being co-extensive with the life/non-life distinction of biology, but biosemiotic tools can contribute to the grounding and refinement of general semiotics (Kull et al. 2011, 33ff.): and thus to the broad conception of life forms and semiosic agency envisaged here in this chapter.

13.7 A Comprehensive Model of Natural and Cultural Life Forms

As a consequence of Peirce's conception of semiotics as logic, "conditional relationships of logic become re-presented in the forms and habits of organisms and their components embodying this bio-logic": this is how Kull, Deacon, Emmeche, Hoffmeyer and Stjernfelt (2011, p. 33) spell out the biosemiotic potential of Peirce.

It was only years after his 1867 essay ("On a new list of categories") that in a manuscript entitled "One, two, three: Fundamental categories of thought and nature" of 1885 Peirce extended his list of universal, phenomenological categories from considering mental phenomena to all of nature: and he did so only after attaining independent empirical justification "in the sciences of nature and thought" (Rosensohn 1974, pp. 61–62). While formerly Peirce's categories had been "drawn from the logical analysis of thought" (*CP* 1.300), his vision now included psychology, the physiology of the nervous system, evolutionary biology, and physics (cf. *CP* 1.364). In fact, the whole point of a biosemiotic study of living processes is to achieve "a more unified semiotic perspective on the processes and patterns that connect the central material phenomena of the living world", extending "from the ribosome, genes, proteins, cells, nervous systems, perception and motor organ's stimulus-driven reflex behavior, to the conscious and experiential world of human beings and higher mammals" (Brier 2012, p. 151). At the same time, the chances for transdisciplinarity are good, for "Biosemiotics and cultural semiotics are alike in methodology..." (Tartu scholar Randviir as qutd. in Cannizzaro 2014, p. 54).[55] In fact, the cultural tradition of knowledge and the biological transmission of (genetic) information can both be dealt with from a unified semiotic perspective since both of them are actualised through semioses. Just as the "culture/nature distinction grows increasingly irrelevant" (Wheeler 2017, p. 28), the two fundamental types of transmission, i.e. inheritance and transmission (cf. Posner 1997, p. 1), are continuous in the sense of Peirce's semiotic synechism.[56] Accordingly, such cultural practices that comprise activities of survival like eating, mating, hunting etc. do not make halt at immediate bodily needs (Brier 2008, p. 276),[57] but extend into various fields and forms of cultural activity (as discussed in the passage following note 53 above; cf. a. Thomsen and Brier 2014).[58] They can be defined on the basis of Peirce's conception of "habit" in such a way as to bring together phenomena of nature and culture in a more comprehensive notion of life forms.

[55] This also becomes clear from the point that Jurij Lotman makes in the conclusion to his *Universe of the mind* (1990): "The individual human intellect does not have a monopoly in the work of thinking. Semiotic systems, both separately and together as the integrated unity of the semiosphere, both synchronically and in all the depths of historical memory, carry out intellectual operations, preserve, rework and increase the store of information. Thought is within us, but we are within thought, [...]. We are both a part and a likeness of a vast intellectual mechanism" (p. 273).

[56] In keeping with the semiotic process of learning, "the *lineage* is a *historical* and *transgenerational subject* that possesses a *collective agency* as such" (Kull et al. 2011, p. 48).

[57] Just so, a drive in the Freudian sense is a "semiotic category" that "provides a psychic mediation and expression of a physiological phenomenon" (Silverman 1983, p. 67).

[58] As Thomsen and Brier (2014) have shown with regard to the model of total integrative evolutionary communication and the foundations for a cybersemiotic discourse pragmatics, the hierarchy of language games comprises 1. biological reflexive *languaging,* 2. the ethological level of instinctual-motivational-emotional *sign plays* and 3. (specifically human) premeditated, intentional symbol-based *language games*, which are all "intertwined with the practice of living, that is, with different *life forms*" in such a way as to form "a coherent biological and socio-cultural practice" (p. 22). For a discussion of how Brier adopts Luhmann's triadic autopoietic system theory for devising his cybersemiotic model of cognition and communication see Vidales, Ch. 3 in this book, pp. 62–64.

Starting from Peirce's notion of habit, we can extend the culture-specific definition of life forms to the realm of nature with the help of biosemiotic approaches and the insights of cybersemiotics. In keeping with Peirce's "fundamental categories of thought and nature" (Rosensohn 1974), such a comprehensive conception is fit to encompass the philologically refined language games of human culture as well as life as the "action of signs" in the biological domain of living systems like cells and organisms (Emmeche and Kull 2011; Cobley 2016). On this basis we can investigate "forms of thought" with regard to the affinity between "human thought" and "the modes of action of the universe" (*CP* 1.351) in the broad phenomenological sense in which Peirce understands consciousness as "the immediate element of experience generalized to its utmost" (cf. *CP* 7.365). Bringing together Peirce's non-psychological conception of semiotics as logic with the phenomenological and process-philosophical theories of consciousness developed in Buddhism (Lusthaus 2002; Waldron 2003), we can thus lay the foundations for a process-philosophical deconstruction of objects and concepts within the context of a cybersemiotic philology of Buddhist knowledge forms. More precisely, from a combined ethological, autopoietic, and semiotic perspective, meaning can be seen to result from "habits established as structural couplings between the living autopoietic system and the hypercomplexity that we call environment (including other living systems)" (Brier 2008, p. 276). Understanding life forms is thus closely tied to the question of how meaning is constituted within the context of culture. As for the notion of "objects", the latter "are cognized within the environment – through abduction – by ascribing sign habits to them that relate to activities of survival such as eating, mating, fighting, and nursing": i.e. what Brier, "extending Wittgenstein's concept, call[s] 'life forms' in a human or animal society" (ibid.).[59] Let us see now how these insights of cybersemiotics can be integrated with the perspectives of both cultural semiotics and Buddhism.

According to the cultural-semiotic notion of "mentefacts", "notions such as 'person', 'animal', and 'plant'" belong to those categories (including ideas and values) with which a society interprets itself and its reality (Posner 2004, p. 16.). This is far from being trivial, as can be seen from the refusal of the Buddhist epistemologists to accept such macroscopic "objects" like e.g. a pot or a person. According to the Buddhist view, such entities exist "in name only" (*prajñaptisat*), even though signs are acknowledged as tools of everyday functioning (cf. e.g. Hattori 1988, p. 32). Just so, according to Peirce the object of a sign functions as "an interpretation used to unify contingent identities between different situations of indexical experience" (Pape 1990, p. 381). In this sense, the codes accepted by a society set up a cultural world linked to a "cultural order": As Umberto Eco (1976) tells us, we are not dealing with the referent, but with the content (as the "semiotic object of a semantics"), which has to be defined as a cultural unit (or as a cluster of such interconnected units) (pp. 61–62). Turning to the level of methodological synergies, in

[59] Coming back to the question of agency (defined as "the capacity of a unit system to generate end-directed behaviors"), we may say that all non-human organisms "do exhibit agency: they ceaselessly strive to find nourishment, find shelter, escape predators, find mating partners or whatever is necessary for them to do in their life" (Kull et al. 2011, p. 53).

particular the fourth cybersemiotic area of sociocultural meaning, I should like to introduce the fundamental Buddhist notion of *saṁjñā* ("apperception") as something of a functional equivalent to the thirdness of Peirce's interpretant. Within the context of Buddhist philosophy, this third "aggregate" (*skandha*) of *saṁjñā* shows the dimensions of language and perception to be intricately linked, thereby unmasking the conventional nature of macroscopic objects as the effect of conceptual superimposition (*kalpanā*). Following Vasubandhu's *Abhidharmakośa,*[60] we may understand *saṁjñā* ("apperception") as referring to the capacity to comprehend the specific "mark" (*nimitta*) of a phenomenal object as its distinctive quality: "As a synthetic mode of apprehension, apperception is caused by a multiplicity of factors including memories, expectations, dispositions, etc." (cf. Coseru 2012). Thus, we arrive at the recognition of a unitary stable object through a process of recognising something *as* something, which is also linked to the creation of something existing "in name only" (*prajñaptisat*) – i.e. as a linguistic entity (cf. Lettner forthcoming-b). The creation of such a (mental) object or concept comes about through the imagination of a "single referent" for "a multitude of changing factors" (cf. Williams 1980, pp. 16–17).[61] From a cybersemiotic perspective, such "systems of recursive processing" as described by Heinz von Foerster in terms of *Eigenvalues* "stabilize in the mind and cause us to (re)cognize things" by means of the interpretant: it is "the signs in our minds that make us see and recognize something as an object" (Brier 2008, p. 274) Just so, the universalising abstraction that takes places by means of *saṁjñā* ("apperception") through the application of conceptual categories is really "recognition due to inference from a sign", with the specific "mark" (*nimitta*) functioning as a sign of class membership (cf. Williams 1980, pp. 16–17).

13.8 The Environment as a Room of Our Own (Un/Making): How to Undo Objects and Concepts in Process-Philosophical Terms

Both in biology and in human cultural life, life forms provide the particular "working context" for the way in which meaning is constituted through structural couplings between organisms and the environment: or rather, between living bodies (endowed with nervous systems) and the particular environments that autopoietic systems like animals or humans (with the help of their own internal organisation) project outside in the form of self-organised *Umwelten* (cf. Brier 2008,

[60] i.e. the *Treasury of Higher Knowledge [and its commentary]* (*AKBh* ad I, 14–16 cf. *AKBh* 1988), "*saṁjñā*" (derived from the prefix *saṁ* "together" and the verbal root *jñā* "to know") gives the meaning "to understand", including the causative sense of "to make intelligible", (cf. Coseru 2012*SEP* no. 2.3).

[61] As the renowned philosopher Bimal Krishna Matilal explains: "Vague and fleeting percepts become fully crystallized into stable and objectified concepts as they pass through the linguistic medium" (1986, p. 312).

pp. 99–100). More precisely, it is by means of signification spheres[62] that the environment presents itself as a room of our own making in Buddhist as well as in second-order cybernetic approaches. As Waldron (2003) explains with regard to the relevance that Bateson's relational and "cybernetic concept of the mind as a system of differences" (Brier 2008, 24ff.) possesses with regard to Buddhist theories of consciousness: "Without an awareness of such distinctions, without such stimuli, there would be no discernment of discrete objects, no separate 'things'" (p. 51). The notion that seeing something repeat itself implies a judgement of similarity that is far from being value-free or objective (Brier 2008, p. 113, following Popper) is also captured by the stance that the Buddhist epistemologist Dignāga (ca. 480–540) takes towards the concepts employed as "mental objects" during the activities of the mind (*manas*)[63]: *cognition presupposes recognition* (Kalupahana 1992, p. 198; 204). In Buddhist terms (as with Vasubandhu and Dignāga) the fact is that by being "common" (*sāmānyalakṣaṇa*) to several objects, concepts and words are not "unique" (*svalakṣaṇa*) (cf. Bhatt and Mehrotra 2000, p. 28), but abstractions: as the objects of "discursive cognitions they are defined by their being similar across various occurrences" and verbalisable (Arnold 2005, p. 29; cf. a. Williams 1980, p. 17). In fact, "the very question of what is common is itself the result of our use [of language, e.g.] of the one term 'blue'" (Williams 1980, p. 17). In contrast to orthodox Indian philosophy developed,[64] the non-essentialism of Buddhism (which refuses the assumption of a permanent self or essence) can be observed with regard to both "subjects" and "objects". Thus, applying the principle of impermanence to living

[62] From a cybersemiotic perspective, "signification sphere" refers to "the world of meaningful semiotic relations for living systems and thus presents us with "a semiotic version of Uexküll's Umwelt concept" (Brier 2008, p. 34): it is "a cybernetic concept that delineates the cognitive domain of a living system (including the biological and psychological systems)" (Vidales, Ch. 3 in this book, p. 64). Thus, the *signification sphere* (or cybersemiotically conceived Umwelt) is not to be confused with Lotman's *semiosphere* as "the set of all interconnected Umwelts" (Kull 1998).

[63] As discussed in Sect. 13.3 above. Cf. Hayes (1988, 183ff.) on the question of universals in Dignāga; cf. also the discussion of universals in Matilal (1986, pp. 41–42).

[64] Such developments in the Upaniṣads led to the conception of a permanent, metaphysical notion of "self" (*ātman*) that in semiotic terms shows a number of structural similarities with the Kantian notion of a "transcendental subject" (Kalupahana 1992, p. 11). In fact, predominant views in Eastern and Western philosophy developed from "presuppositions of a prime cause, an unalterable absolute", from which they derived "their linearity and their distinction between substance and attribute" (cf. Macy 1991, p. 32). Vedic equations of reality with changelessness and Greek theories of being and substance put forth by key thinkers like Parmenides and Aristotle are a case in point. For a brief look at Parmenides as the "founding figure of the [Western] ontological paradigm" cf. Lettner (2011). For Aristotle's famous notion of the "unmoved mover" see *Metaphysics* 4.1012b, which tells us about the "prime mover being itself unmoved" ("τὸ πρῶτον κινοῦν ἀκίνητον αὐτό") (cf. Aristotle trans. 1978). While we cannot go any further into this here, an intercultural philology of thought forms needs to stay open to the possibility that views about some permanent ground of being are not only theoretical positions of philosophy, but actually express some experiential or even supra-experiential knowledge of reality gained by direct intuition or insight.

beings, we come to notice "the absence of the permanent and enduring inner core, selfness, or essence (*ātman*, *svabhāva*) in our personality and in all phenomena we can observe, both inside and outside ourselves" (Lysenko 2017, p. 306). In the same vein, Dignāga analyses the "determination" or "fixing of the boundaries" of an object (*artha-niścaya*) as the outcome of *kalpanā*, i.e. "conceptual construction" (Kalupahana 1992): for the discrimination involved in such seemingly "absolute distinctions" as are drawn e.g. between white and non-white, cow and non-cow, are not part of "direct perception" (*pratyakṣa*), but the results of a "rational enterprise directed at determining the boundaries of *conceptions*" (p. 200, my emph.). In Peircean and cybersemiotic terms, "differences become information when an interpreter sees them as signs" (Brier 2008, p. 99): that is, when objects and concepts function as cognitive invariants. Because words "necessarily designate relatively invariant types of things", in the epistemology of Dignāga they are understood not to be constrained by specifiable causes and thus to lack the decisive feature of causal efficacy for being "ultimately existent" (*paramārthasat*) (cf. Arnold 2005, pp. 23–24).

Buddhism, by contrast, explains the experience of permanence as the result of conceptual superimposition upon what are only momentary phenomena (cf. Bhatt and Mehrotra 2000, p. 1). This insight links up well with the cybersemiotic understanding of circular causality as set out by Austrian American physicist, philosopher and second-order cybernetician Heinz von Foerster, who employs "the mathematical idea of *Eigenvalues*[65] (also used in quantum physics) to provide a model of how objects ('of reaction') are manifested in living, sensing autopoietic systems" (Brier 2008, p. 230): "objects are not primary entities, but subject-dependent skills which must be learned and hence may even be altered by the cultural context as well" (von Foerster 1980, 23, 26 as qutd. ibid.). While not being "true" in any universal sense, the forms of distinction developed by an observer still acquire "an operational effectiveness in relation to the life praxis of the system in question": *we can see the bringing forth of objects and concepts as cognitive invariants* (p. 86). The Buddhist view is rather similar with regard to the conventional distinctions drawn by an "observer" on the basis of cultural conditioning and linguistic mediation. Buddhism dispenses with substantialistic notions of objectivity to the effect that "words are only signs made for the purpose of daily functioning" (Hattori 1988, 32ff.). Not only do macroscopic objects not possess any real existence, but even microscopic objects like colour patches must not be regarded as instantiations of some universal quality they could be seen to participate in (Lusthaus 2002, p. 20). This is in fact very similar to the "computation of invariants" sketched by von Foerster, which can occur in the form of "object constancy, perceptual universals, cognitive invariants, identifications, namings, and so on" (1992 as qutd. in Brier 2008, p. 87).

[65] "*Eigenvalues* are all those values of a function that, when operated on, produce themselves" (Brier 2008, p. 230). In terms of systems theory and cognitive biology, the notion of Eigenvalues and objects refers us back to the concept of "structural couplings" between an autopoietic system and its environment as well as to the ethological view of sign stimuli (cf. pp. 230–231).

As for the fluid and unstable nature of the "object", we can now point out a number of parallels with regard to the quantum ontological implications for objectivity. As a result of significant developments in both the (special) theory of relativity and quantum theory, a number of key assumptions of classical physics do not hold any more. Most importantly, "...the classical idea of the separability of the world into distinct but interacting parts is no longer valid or relevant" (Bohm 1980, pp. 124–125). According to relativity theory, we need to speak of events and processes rather than deal with such concepts as point particles or the quasi-rigid body. Hence, in the case of such a complex process as going on within a "world tube", the object turns out to be "an abstraction of a relatively invariant form", being "more like a pattern of movement than like a solid separate thing that exists autonomously and permanently" (Bohm 1980, p. 124). These views nicely converge with the Buddhist "radical move of bracketing the object as such from being a substance in which perceptible properties inhere" (Lusthaus 2002, p. 31).[66] We can also exploit synergies between Buddhism and the findings of cognitive science and evolutionary biology, which allow us to bring into view "patterns of interaction" rather than merely "independent acts of isolated entities" (Waldron 2002, p. 14). More precisely, those patterns help us to explain both "immediate forms of cognitive awareness" and "the living forms we all embody" (Waldron, ibid.): i.e. what in the present chapter have been called "thought forms (in the narrow sense)" or "(phenomenal) forms of consciousness"[67], which are embodied and enacted in terms of "life forms" according to the present model (see Fig. 13.3 above; cf. a. Lettner 2020, p. 190; 197–199; Lettner forthcoming-d).

How does Buddhist philosophy deal with objects? As for early (Pāḷi) Buddhism, in an advanced stage of meditative insight "one construes' (*karoti*) no sign in what one contemplates", but embraces signlessness (Harvey 1986, p. 40; cf. Lettner 2020). What we see in the (later) Mahāyānistic philosophy of Yogācāra, which is known for its central teaching of "cognition only" (*cittamātra*) (see the discussion relating to the sketch of Buddhist schools in Fig. 13.7 above, incl. note 23), the (supposedly outside) "object" is considered as being merely the result of a modification

[66] Moreover, Peirce's explanations about how objectification is made possible through the generalising and quasi-inferring abstraction that is brought to bear upon the perceptual coalescence of percepts by the intellect (De Tienne 1999, p. 426) would also be interesting to explore with regard to Dignāga's treatise *Ālambanaparīkṣā* (*-vṛtti*), "Investigation about the support of the cognition" (incl. the commentary) (cf. Tola and Dragonetti 2004, 10ff.), where a refusal of positing "nonmental, external objects as what is directly intended by cognition" (Arnold 2005, p. 22) involves an in-depth discussion of *viṣaya* as the "object" or "field of operation" of the sensory faculties in comparison to *ālambana* as the "object-support" or "support of cognition" which is grasped by the mind (cf. a. Dignāga 1968, p. 89 and Hattori 1988, 27ff. incl. a look at Vasubandhu) (see also Appendix II on the six "sensory objects" among the *āyatanas*, cf. (5)).

[67] In order to work out in more detail a phenomenological basis for cybersemiotics in Buddhist and intercultural-philosophical terms, phenomenal forms of consciousness will need to be explored in light of various possible overlaps between 1. Peirce's phaneroscopy and Buddhist phenomenology as well as between 2. Peirce's theory of perception and the theories of the Buddhist logico-epistemological school, notably Dignāga and Dharmakīrti. (Also see notes 5, 6 and 9 above)

of consciousness. The assumption that the latter is "self-contained" in the sense that "its content is the result of its own inner modifications" (Murti 1955/2008, p. 106) is actually very similar to the organisational closure of the nervous system as explained by the "structural couplings" of cognitive biology: rather than "picking up information" from its surroundings, the nervous system "brings forth a world" (Brier 2008, pp. 88–89). In keeping with its refusal to accept "objects as external substantial entities" (Hall 1986, p. 14), Yogācāra however comes much closer to critical epistemological idealism than expounding anything like metaphysical idealism. Lusthaus (2002, ch. 1) has convincingly argued that Yogācāra seeks nothing less than to deconstruct the deep-seated conditioning that keeps us locked within an "appropriational circuit" between the subject as "grasper" (Skt. *grāhaka*) and objects or entities that are "grasped" (Skt. *grāhya*) as the result of our own projections. Since in semiotic terms Yogācāra Buddhism implies "Reference without a referent" (cf. Lettner forthcoming-c), it raises a number of interesting questions for epistemology and the (noetic) constitution of objectivity in phenomenology. While the Sarvāstivādin ontological critique boils down to a "vertical" deconstruction of "empirically existing" (*prajñaptisat*) entities into "ultimately real" (*dravyasat*) existents (cf. Lettner 2020, pp. 202–203), the Vijñānavādins sought (the) truth (of x) "not in entities but epistemologically in a *fact*"; i.e. the fact that the dependently originated element is empty of the hypostasised entity of linguistic reference (cf. Williams 1980, p. 8). Such an assessment actually takes us back to possible synergies between Buddhism and the postclassical (philosophy of) science. Quantum ontology also has significant implications for an appropriate use of language: "Bohr would never allow the type of language that admitted the *independent existence* of any kind of quantum object" (my emph.) in the sense of speaking about the "existence" of a particle between various quantum measurements (Bohm and Hiley 1993, p. 18). As a result of the "semiotic richness" of objects, scientific modelling can no longer rely upon a "straightforward instrument-object observership" (Cobley 2018, p. 25).[68] As Bohm (1980) tells us, it is therefore no accident that "significance, meaning, and communication became relevant in the expression of the general descriptive order of physics..." (p. 123). In postclassical physics, self-referential processes have brought about "a rapprochement between thought styles we had come to view as essentially separated, namely, the hermeneutic activities of the humanist and the experimentation-cum-calculation model of the natural scientist" (Wallmannsberger 2003, p. 91): a development that also finds expression in a mutual enrichment between biosemiotics and the humanities (Favareau et al. 2017).

[68] Within the context of classical physics, the assumption of object constancy alone allowed for a fundamental separation between object and measurement process: the measured values produced by an apparatus were formulated in theoretical language with an explanation in causal terms (cf. Wallmannsberger 2002): by contrast, the postclassical paradigm comes much closer to a hermeneutical relation formerly known only from the language-oriented sciences (cf. p. 56).

13.9 Perspectives for a Cybersemiotic Philology of Buddhist Knowledge Forms

The evidence adduced in this chapter has been directed against fragmented forms of disciplinary discourse that all too easily rely upon dichotomous conceptions for explaining phenomena of life and consciousness. Disciplinary fragmentation is also an outcome of the tendency towards conceptual construction and distortion as diagnosed by Buddhism. The traditional ideals of scientific objectivity are no less prone to the necessarily mediated perception of reality and its inevitable effects of hypostasising the products of both linguistic and conceptual superimposition. In view of this, a mere addition of "Buddhist vocabulary" is not going to suffice for attaining an intercultural and transdisciplinary broadening of scholarly discourse. A "semiotic philology of thought forms" (Lettner, forthcoming-a) has been introduced as a complementary approach to the cybersemiotic venture of Søren Brier (2008 ff.): what it can contribute is an intercultural-philosophical and philological model for describing thought forms as paradigmatic modes of knowledge representation. In order to lay the foundations for a cybersemiotic philology of Buddhist knowledge forms, a traditionally humanistic interest in cultural forms and philosophical categories has been integrated with the more natural-scientific and biosemiotic interests of cybersemiotics. The approaches of Buddhism and postclassical physics have taught us how to *un*do objects and concepts in Peircean process-philosophical terms. Peirce's semiotics and Brier's phenomenologically based cybersemiotics have provided us with a comprehensive framework for integrating cultural-semiotic approaches, biosemiotic issues, and Buddhist theories of consciousness to the benefit of developing transdisciplinary and intercultural synergies. Thanks to its various affinities with "bio-constructivist theories" as examined by Brier (2008, p. 338), Buddhism may help us to further build upon the necessary "stepping stones to the development of a cybernetic, systemic, and biosemiotic view of reality" by enriching cybersemiotics with the various possible contributions of intercultural philology.

Summing up, let me mention a number of issues that deserve to be discussed in more detail in order to work out more fully a Buddhist interpretation of cybersemiotically conceived knowledge forms. To start with, the cybersemiotic integration of ethological concepts of motivation with questions of perception and action as described by Uexküll's functional cycle raises questions highly relevant to the central Buddhist topic of craving and desire, which according to its teachings are the main reasons for keeping humans bound in the cycle of saṁsaric existence. Moreover, drawing attention to "the difficulty of integrating the autopoiesis of self-consciousness, the body-mind, and social communication through language" in Luhmann's conception of autopoietic systems, Brier (2008) has argued for further fleshing out a theory of embodied meaning (p. 237). In order to bring into view the embodied semiosis of living systems with regard to Buddhism, an investigation of Peirce's biological, mental, and social habits would profit from their consideration with regard to the so-called "karmic formations" (Skt. *saṁskāra; Pā. saṅkhāra*) of body (*kāya*), speech (*vacī*), and mind (*citta*): *kāyasaṅkhārā*, *vacīsaṅkhārā* and *cittasaṅkhārā* (Pā. pl.). Along these lines, the pragmatic understanding of life forms as "forms of interpretation" (Abel 2003) will need to be expanded with regard to the Buddhist view of *karma*, "action" (cf. Skt. *kṛ* "to do", "to make") – or, indeed "habit": this is how Lusthaus (2002) so aptly translates the concept of *karma* as a comprehensive notion of action and that also comprises the "psycho-ontological consequences" of action (Waldron 2003). In view of this, the "karmic formations" can serve as a point of departure for exploring Buddhist life forms with regard to the continuity between natural and cultural as well as between psychic and cosmological phenomena. Moreover, the process-philosophical outlook of Buddhism as described by the fundamental principle of "dependent arising" (*pratītyasamutpāda*) leads to important synergies with cybersemiotics that can be captured by a systems theoretical reading of Buddhism (Macy 1991).

At the same time, there are a number of overlaps between Buddhism and cybersemiotics that would profit from a more detailed exploration of what constitutes a living system in Buddhist terms.[69] Working out in more detail such steps to a Buddhist biosemiotics would start from the notion that what from a Buddhist perspective keeps a human bundle of psycho-physical processes "alive" *beyond death* is the autopoietic circular organisation of its self-organising system in terms of "co-dependent arising". Thanks to the combined systemic process ontology and epistemology it offers, the transdisciplinary and non-reductionist framework envisaged by the Cyber-Ecosemiotic paradigm for nature and culture (cf. Brier 2018b) also lends itself well to the further development of a cybersemiotic philology of Buddhist knowledge forms: on the basis of Peirce's conception of relational process logic as semiotics, Brier calls for taking "consciousness 'out of the head' and into an interactive embodied meaningful communication field among living beings that goes beyond language".[70] Arguably, such an attempt to move beyond an excessive and exclusive interest in language can again profit from a Buddhist critique of thought forms and life forms with regard to language and conceptual formation as offered within the context of Abhidharma and Yogācāra Buddhist theories on cognition: for taking into account living embodiment, they develop the psychic and cosmic dimensions of life with regard to a fundamentally ethical understanding of sentient existence. It is thanks to the integration of culturally diverse views on language, logic, ontology, and epistemology at the very basis of a cybersemiotic philology of

[69] Waldron's (2002) "Buddhist steps to an ecology of mind" presents a very valuable interpretation of the "dependent arising" of the world and cognitive awareness with regard to cognitive science, evolutionary biology and the theories of Gregory Bateson.

[70] Cf. Peirce's letter to Lady Welby of 14 March 1909: "I at first defined logic as the general science of the relation of *symbols* to their *objects*. And I think still that this defines the Critic of Argument which is the central part of logic,—its heart. But studies of the limits of the sciences in general convinced me that the Logician ought to broaden his studies, and take in every *allied* subject that it was no business of anybody else to study and in short, and above all, he must *not* confine himself to *symbols* […] I think, dear Lady Welby, that you are in danger of falling into some error in consequence of limiting your studies so much to Language and among languages to *one* very peculiar language, as all Aryan Languages are; and within that language so much to *words*." (ed. by Lieb 1953, p. 39; parts quoted also in Brier 2018b, ibid.).

knowledge forms that we hope not to be "in danger of falling into some error" of limiting our studies "to *one* very peculiar language" and "and within that language so much to *words*".

Acknowledgements My deep gratitude goes to Søren Brier for the encouragement provided by his intellectual resonance as well as to Carlos Vidales for his cooperative way of ensuring supportive working conditions. As Erich Jantsch puts it in *The Self-Organizing Universe* (1980): *A true dialogue is never the exchange of readily available knowledge, but also active organization of knowledge which was not in the world before.*

The Appendix (incl. parts I + II) provides a visual summary of Buddhist philosophical conceptions adduced for developing the four cybersemiotic areas of knowing in intercultural-philological terms. *Dharmas* as minimal constituents of experience (discriminated in Buddhist phenomenological analysis) provide us with a central explanatory conception corresponding to the qualia of consciousness. The "conditioned arising of phenomena" (*pratītyasamutpāda*) and the "five aggregates" (*pañcaskandha*) of human empirical personality constitute two fundamental schemes for classifying *dharmas* and for explaining the cognitive (and cosmological) arising of sentient existence. By explicating the four main cybersemiotic areas of knowing with regard to the indicated Buddhist conceptions we can set out the basic coordinates of a cybersemiotic philology of Buddhist knowledge forms.

Appendix (I)

FOUR MAIN **AREAS OF KNOWING** ACCORDING TO THE **"CYBERSEMIOTIC STAR"** (**BRIER 2008**)				**CYBERSEMIOTICS**
physical-chemical-informational dimension of	**biological** and **evolutionary** dimension of	**phenomenological-hermeneutical-individual-psychological** dimension of	**socio-cultural** dimension of	relevant **SCIENTIFIC dimension**
(physical) NATURE	**(organic) LIFE and EMBODIMENT**	**(experiential) CONSCIOUSNESS**	**(social) MEANING**	**AREAS of KNOWING**
energy, matter, information	**(autopoietic) living systems**	**QUALIA**	**language, practical habits**	**explanatory concepts and domains**
THE CONDITIONED ARISING OF PHENOMENA, INCLUDING THE **"FIVE AGGREGATES"**				**BUDDHIST PHILOSOPHY**
"phenomenological naturalism" (Coseru 2013); **"dharma of natural systems"** (Macy 1991)	**"FIVE AGGREGATES"** (***pañcaskandha***) of **human empirical existence**	***DHARMAS*** **(i.e. minimal, processual constituents of experience) classified into**	**objects** and **concepts** (ideas) as part of a **"linguistic-cognitive web of closure"** (Lusthaus 2002)	The **FIVE** ***SKANDHAS*** with regard to the **arising of PERCEPTION** (Hayward 1987):
skandha **no. 1: *RŪPA*** **"sensate matter", "material form", "body"** ≙ **INITIAL SENSORY INPUT**		***skandha*** **no. 2: VEDANĀ** **"feeling", "sensations" (pleasant, unpleasant, neutral)**		≙ **INITIAL REACTIVITY**
		skandha **no. 3: SAṀJÑĀ "apperception" "conceptual identification", "discernment"**		≙ **FIRST DISCERNMENT OF AN OBJECT AND A "SELF"**
skandha **no. 4: SAṀSKĀRA "DISPOSITIONS" (i.e. conceptual contents of experience with affects), EMBODIED, PSYCHO-PHYSICAL CONDITIONING from the past, "HABIT-FORMATIONS" LATENT, UNCONSCIOUS PROCESSES, including evolutionary inheritances; "KARMIC FORMATIONS" (i.e. constructing activities) of** **body (*kāya*)** **mind (*citta*)** **speech (*vacī*)**				≙ **FORMATIONS OF EMOTIONAL AND THOUGHT COMPLEXES**
the external "physical-material" pole		***skandha*** **no. 5: *VIJÑĀNA*** **"consciousness" or "awareness"**		≙ **SIX MODALITIES OF SENSORY OR COGNITIVE AWARENESS "sensory bases" (*āyatana*)**
		the inner "mental" pole		**conceptual proliferations of dualistic experience**

In order to visualise the conditioned arising of phenomena as conceived according to Buddhist philosophy, the lower part of the table given in Appendix I starts out by presenting the “five aggregates” (*pañcaskandha*) of human empirical existence, i.e. 1. “material form” or “body” (*rūpa*); 2. “sensations” (*vedanā*); 3. “apperception” (*saṁjñā*); 4. “volitions” or “dispositional formations” (*saṁskāra*); and 5. “consciousness” (*vijñāna*). There are in fact various overlaps between the *skandhic* model and the conception of “dependent arising” (*pratītyasamutpāda*), whose single “links” (*nidāna*) are set out in Appendix II. While in the *pañcaskandha* model *vedanā* (“feeling”, “sensations”) appears as the second “aggregate” of *dharmas*, in the series of “dependent arising” it constitutes link no. 7: in the latter context, it comes after two links that are central to explaining the functioning of sensory perception, i.e. (5) the “sensory bases” (*āyatana*) and (6) “(sensory) contact” (*sparśa*). *Skandha* (4) in the model of the five aggregates, i.e. “karmic or dispositional formations” (*saṁskāra*), also constitutes link 2 in the series of “dependent arising”; (5) “consciousness” (*vijñāna*) also constitutes link 3.

As regards the process of perception, the right most column of Appendix I provides us with a schematic overview of the way in which the “five aggregates” (*pañcaskandha*) are involved in the arising of perception (proper). The initial reactivity associated with “feeling” (*vedanā*), which actually connects the physical-material pole (*rūpa*) and (the *skandhas* of) the mental pole (*saṁjñā*, *saṁskāra* and *vijñāna*) is an automatic affective response that is “pleasant” (*sukha*), “unpleasant” (*duḥkha*) or “neutral” (*asukha-aduḥkha*) and “accompanies cognition of any primary form” (Hayward 1987, p. 59, my emph.; cf. Lusthaus 2002, pp. 305–306; Waldron 2003, pp. 34–35). Arguably, as a rough equivalent to the thirdness of Peirce’s interpretant, the conceptual overlay of associations sets in with the third *skandha*, *saṁjñā*, i.e. “apperception” or “conceptual identification”: and as such it implies a first “discernment” between an “object” and a “self” in the form of a linguistically mediated interpretation of something *as* something (cf. Lettner forthcoming-b). Being regulated by a habit, the Buddhist understanding of *saṁjñā* is at the same time highly interesting with regard to the cybersemiotic view of “objects and concepts as cognitive invariants” (Brier 2008) (see Sect. 13.8). As set out in Sect. 13.6, Peirce’s notion of the human being as a “bundle of habits” is captured well by the fourth *skandha* of the so-called *saṁskāras* (“karmic formations” or “latent dispositions”): by means of embodied conditioning (that has accumulated in the form of painful and pleasurable experiences of body, mind, and speech) the *saṁskāras* predispose us to react in certain ways and to do so (by means of "intention" and "volition", *cetanā*) with certain "forms of desire", thereby determining our empirical personalities in terms of "bundles of such habitual predilections" (Lusthaus 2002, pp. 48–49). These formations of both emotional and thought complexes include not only simple thought patterns and mental functions, but also more complex philosophical, religious, psychological, and scientific belief systems (Hayward 1987, p. 60). Hence, the *saṁskāras* can teach us a lot with regard to the way in which the social, material and mental dimensions of culture (as well as the habits of a particular subculture) are practically enacted, but also experientially embodied (by means of memory) in the form of various interrelated practices (bodily, psychic, linguistic, social etc.) (see also Appendix 2). "Consciousness" (*vijñāna*) as the fifth *skandha* of the "five aggregates" can be seen to mediate between those "habit formations" (*saṁskāra*) and the remaining *skandhas* or *nāma-rūpa* ("name-and-form", see "link" (4) in Appendix 2): by presupposing a "linguistically-complex conscious body" (Lusthaus), *nāma-rūpa* implies both the sensorial embodiment (*rūpa*) inherent in "sensate matter" (cf. Lettner 2021) and the comprehensive psychocognitive sphere of *nāma*, which includes the "linguistic 'excess'" of "mistaking interpretation for reality" due to processes of projection and identification (Lusthaus 2002, pp. 54–55; 59). As can also be seen from the bottom right box in Fig. 13.8, contributing to a cybersemiotic philology of knowledge forms from a Buddhist perspective will need to involve an investigation of objects and concepts ("ideas") with regard to their functioning within a "linguistic-vcognitive web of closure" (cf. Lusthaus, 2002, p. 61).

Appendix (II)

<table>
<tr><th>NATURE</th><th>LIVING EMBODIMENT</th><th>CONSCIOUSNESS</th><th>MEANING</th><th>CYBERSEMIOTICS</th></tr>
<tr><td colspan="4">THE TWELVE CONDITIONED AND CONDITIONING LINKS (NIDĀNA) OF “DEPENDENT ARISING” (PRATĪTYASAMUTPĀDA)</td><td>BUDDHIST PHILOSOPHY</td></tr>
<tr><td></td><td></td><td></td><td>(1) AVIDYĀ
“(spiritual) ignorance”</td><td rowspan="2">PAST LIFE</td></tr>
<tr><td colspan="4">(2) SAṀSKĀRA “karmic formations”, activities of “mind” (citta), “speech” (Skt. vāc; Pā. vacī) and “body” (kāya)
←→ CETANĀ “volitions” etc.</td></tr>
<tr><td></td><td></td><td>(3) VIJÑĀNA
“consciousness”</td><td></td><td rowspan="8">CURRENT LIFE
→ incl. psycholinguistic phenomena like prajñapti “(nominal) designation” and prapañca “mental proliferation”</td></tr>
<tr><td colspan="4">(4) NĀMA-RŪPA “name-and-form”, i.e. a “lived body”, “a linguistically-complex conscious body” (Lusthaus 2002):
a psychophysical organism or a phenomenal body (kāya), implying the → “FIVE AGGREGATES” (pañcaskandha)</td></tr>
<tr><td colspan="2">RŪPA-SKANDHA</td><td colspan="2">NĀMIC/ MENTAL SKANDHAS</td></tr>
<tr><td colspan="2">physical phenomena</td><td colspan="2">the components of conscious and unconscious experience, i.e. the single dharma of CITTA “consciousness” and various CAITASIKA (pl.) “mental concomitants”</td></tr>
<tr><td></td><td colspan="3">(5) ĀYATANA “the six sensory bases” (ṣaḍāyatana)*</td></tr>
<tr><td>Six
sensory objects (viṣaya)
“external bases”
(bāhya-āyatana), including “mental objects” (dharma-s)</td><td>Six
sense faculties (indriya)
“internal bases”
(adhyātma-āyatana), including “mind” (manas)</td><td>Six modalities of “cognitive awareness” (vijñāna), i.e. visual, auditory, olfactory, gustatory, tactile and mental cognitive awareness (mano-vijñāna)</td><td>* the usual classification is:
6 external bases + 6 internal bases = 12 “sensory bases” (āyatana) + 6 modalities of “cognitive awareness” = 18 “elements” (dhātu)</td></tr>
<tr><td></td><td colspan="3">(6) SPARŚA (i.e. sensory) “contact”, (7) VEDANĀ “feeling”</td></tr>
<tr><td></td><td colspan="3">(8) TṚṢṆĀ “CRAVING” (lit. “THIRST”), (9) UPĀDĀNA “GRASPING”</td></tr>
<tr><td></td><td colspan="3">(10) BHĀVA “BECOMING”</td><td rowspan="3">FUTURE LIFE</td></tr>
<tr><td></td><td colspan="3">(11) JĀTI “BIRTH”</td></tr>
<tr><td></td><td colspan="3">(12) JARĀ-MARAṆA “ageing and death” and other states of duḥkha (“suffering”)</td></tr>
<tr><td colspan="5">BUDDHIST CONCEPTIONS ADDUCED FOR DEVELOPING THE CYBERSEMIOTIC AREAS OF KNOWING IN INTERCULTURAL-PHILOLOGICAL TERMS</td></tr>
</table>

The sketch portraying the twelve-limbed formula of "dependent arising" (*pratītyasamutpāda*) with regard to three distinct lifetimes in Appendix II shows us how activities instigated by "(spiritual) ignorance" (*avidyā*) build up as psycho-physiological structures (*saṁskāra*) persisting from a past life and directly condition the arising of "(rebirth) consciousness" (*vijñāna*) in the current life: as consciousness descends into the womb of the mother, the psychic and physical components of sentient existence, i.e. "name-and-form" (*nāma-rūpa*), grow and develop into the "the six sensory bases" (*ṣaḍāyatana*) of a human being (cf. Waldron 2003). For a discussion of the so-called "sensory bases" (*āyatana*), which (as part of a "sensorium" of 18 "elements", i.e. *dhātu-s*) explain how "consciousness" (*vijñāna*) arises through any of the six modalities of (momentary) "cognitive awareness" when there is "contact" (*sparśa*) between a "sensory faculty" (*indriya*) and a corresponding "object" (*viṣaya*), see Lettner (2020, note 7). "Contact" (*sparśa*) conditions "sensation" or "feeling" (*vedanā*), which typically elicits the afflictive processes of "craving" (*tṛṣṇā*) and "grasping" (*upādāna*) as part of a recursive feedback cycle: and the latter in turn condition the renewal of existence in a future life through the arising of "becoming" (*bhāva*), initiating another round of "birth" (*jāti*), "ageing and death" (*jarā-maraṇa*), which also includes other states of "suffering" (*duḥkha*) (cf. Waldron 2003, p. 5; 132). At the same time, suffering can become the turning point that leads "from the wheel of causation to the path of liberation" by reversing the order (Govinda 1961, p. 72): becoming free from *saṁsāra* is conceivable precisely because we have "neither a purely temporal, nor yet a purely logical causality", but a living, organic juxtaposition of all the links in view of which "the entire chain at every moment and from every phase of it, is removable": it bears in itself not only the whole past, but "all the possibilities of its future" (loc. cit. p. 56) in a way that ties in nicely with a position that combines complexity theory and transdisciplinarity by regarding futures as "a spectrum of non-deterministic possibilities" (Cilliers & Nicolescu 2012, p. 713).

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[71] **Abbreviations and Spelling Conventions**

Unless otherwise indicated, (when discussing Buddhist philosophy as well as concepts from classical Indian philosophy) terms given in italics are Sanskrit (Skt.). Pāḷi terminology has been indicated by adding "Pā.". For a short look at the Buddhist theoretical view on language see the brief outline towards the end of note 40. The major collections of Buddhist texts have been introduced in the passage dealing with the second pillar of philology (following Fig. 13.7 in Sect. 13.2 above, including note 27). Whenever the English translation of a Sanskrit or Pāli term is given first, as in "(uniquely) defining characteristics" (*svalakṣaṇa*) or "karmic formations" (Skt. *saṁskāra*; Pā. *saṅkhāra*), the term in brackets corresponds to the stem form in Sanskrit or Pāḷi (i.e. without any plural inflection). Due to the by now common use of the original terms in Western discussions of Buddhist philosophy, you may also find Sanskrit or Pāḷi expressions whose plural has been formed by adding the English plural morpheme (i.e. the ending –s), as in *dharmas* (Skt.) or *dharmas* (Pā.), *saṁskāras*, *skandhas* ("heaps") or *svalakṣaṇas*. When quoting from Aristotle, (unless the sources consulted were already giving relevant terms or phrases in transliteration) Greek terminology or short passages from his works have been indicated using Greek letters in keeping with current editing conventions that involve the use of lower case letters as well as accents and diacritical marks where appropriate. Quotations in the body of the paper that refer to entries retrieved from the Stanford Encyclopedia of Philosophy (*SEP*) have been made by indicating the number of the relevant section (no.).

AKBh = *Abhidharmakośabhāṣyam*, see *AKBh* (1988) = *Abhidharmakośabhāṣyam* by L. de la Vallée Poussin. *L'Abhidharmakośa de Vasubandhu*, 6 vols. 1923–1931/1980. Engl. trans. by L. M. Pruden 1988-1990, 4 vols., vol. 1 (1988); vol. 3 (1990/1991). Berkeley, CA: Asian Humanities Press. The *Treasury of Higher Knowledge* is a collection of ca. six hundred verses or kārikās and its autocommentary, i.e. the *Abhidharmakośabhāṣyam* (cf. *bhāṣyam* "commentary"; *kośa* "treasury"; *abhidharma* "higher doctrine") of Vasubandhu (4th-5th century C.E.). While the verse portion presents the Abhidharma as taught by the Vaibhāṣikas of Kaśmir, the autocommentary reflects Vasubandhu's sympathies for the Sautrāntika position (cf. Poussin/Pruden, vol. 1, 3ff.).

CP = Peirce, C. S. (1931–58). Collected papers: vols. 1–6, Eds. C. Hartshorne & P. Weiss; vols. 7–8, Ed. A. W. Burks. Cambridge (MA): Harvard Univ. Press.

EP 2 = Peirce, C. S. (1998). *The essential Peirce: Selected philosophical writings*. Vol. 2 (1893–1913). (The Peirce Edition Project, N. Houser gen., Ed.). Bloomington: Indiana Univ. Press.

PS = *Pramāṇasamuccaya*, i.e. a "collection [of remarks]" (*samuccaya*) on the "means of [valid] cognition" (*pramāṇa*), see Dignāga (1968). *On perception, being the Pratyakṣaparicchesa of Dignāga's Pramāṇasamuccaya from the Sanskrit fragments and the Tibetan versions*. Trans. and annot. by M. Hattori. Cambridge, MA: Harvard Univ. Press.

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Chapter 14
Cybersemiotics and Epistemology: A Critical Review of the Conditions of "Observation" from Transcendental Semiotics

Julio Horta

Abstract This chapter aims to establish a philosophical discussion about the epistemological conditions of "observation", from the cybersemiotic transdisciplinary view of knowing. For this purpose, the discussion will be divided into three parts, each one of them with the intention of outlining a conceptual critique that later allows a pertinent justification of the observation from a transcendental semiotics. This work is based on a problem: it seeks to show that a the cybersemiotic point of view, to consider on a foundationalist stance, fails to overcome the epistemological contradictions involved in the contemporary critique of modern philosophy. Hence, the objective on this work is to propose as an alternative the teleological and nominalist attitude of transcendental semiotics, and also as an epistemological principle that allows overcoming problems of the foundationalist. Then, in a first moment, we will seek to establish a critique of the phenomenology of observation from the pragmatic point of view, developed by N. R. Hanson and Richard Rorty. In this direction, the contradictions involved in the definition of knowledge will be shown from the phenomenological (perception without representation) and phenomenological (states of inner consciousness) positions. In general terms, the epistemological problems found in the foundations of knowledge based on observation will be exposed: specifically, the problem of the empirical basis and perception and the question of the mind as an inner space. Then, in a second moment, a characterization of the "observation" and the "observable fact" will be made from the cybersemiotic point of view. In this sense, these concepts will be described from the peircean semiosis, starting from the theoretical link proposed by Søren Brier. Hence, when considering the observation within the sphere of significance, the approaches will show a non-phenomenological characterization of knowledge and, from there, the overcoming of pragmatic critiques towards phenomenology. The closing will allow circumscribing knowledge from a communicative, semiotic and autopoietic

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approach. Finally, and as a contribution to the state of the discussion, the present chapter will make a defense of the cybersemiotic phenomenology of observation but considering the pragmatic conditions of knowledge from a transcendental semiotics perspective. In this sense, the transcendental concepts of truth-consensus and fin-ideal will be used to develop a relevant theoretical field that allows a transcendental justification of the communicative-intersubjective nature of knowledge postulated by cybersemiotics.

Keywords Phenomenology · Observation · Epistemology · Cybersemiotics · Foundationism · Community · Pramatism

14.1 Introduction

The theory of knowledge has a peculiar aspect in modernity: it accepts the ontological commitment implied in the relationship between the subject that knows and the object that is known by the subject. This ontology derives of a realistic position, in which it is not only considered that it is the rational activity of the subject that allows knowing the true nature of the real. It also implies, in a more radical sense, that the subjective determination of the object is a necessary condition to objectively apprehend the empirical reality.[1] In this mode of knowledge, which comes from the philosophy of René Descartes, "the last and only possible criterion of truth beyond which it is no longer possible to go is encrypted. The truth is irrefutable 'spirit pure and attentive' concepts only born of the light of reason"[2] (Cassirer 1998, p. 35).

In the seventeenth century, this position referring to knowledge, would give epistemology a fundamental role in its relationship with science. What for Richard Rorty constitutes "the court of reason", for Cassirer is the "tribunal of philosophy". In any case, there is a hierarchical link where regulated philosophandi[3] establishes a necessary condition for scientific knowledge. From this perspective, it is possible to generalize the conduct of modern philosophy as the construction of a particular language, whose assumptions are wrapped in philosophical language used by Galielo and Descartes. Within this semantic space, there is a reduction of the philosophical approaches to links between terms and propositions. Trying to describe scientific problems from this point, involves "inductive presuppositions" and

[1] Under this nuance, scientific truth, as a "necessary and universal" proposition / conclusion, would not only be functionally justified within a system of philosophical language; it would also imply the concrete possibility of accessing the objective knowledge of nature.

[2] The author of this chapter on the basis of the edition carried out the translation of this quotation in spanish. The consulted original quotation is as follows: "se cifra el último y único posible criterio de verdad más allá del cual ya no es posible ir. La verdad consiste en los conceptos indubitables del 'espíritu puro y atento' nacidos exclusivamente de la luz de la razón."

[3] Term used by I. Newton in *Philosophiae naturalis principia mathematica* (quoted by Cassirer 1998, p. 103 and ss.).

"empirical generalizations". Now then, it is appropiate to affirm that "both Locke, like Berkeley, Leibniz and Hume, as well as Kant, suppose in a general way that the scientific knowledge rests within the framework of the laws, whose logic is a necessary way" (Buchdahl 1969, p. 62).

In the scientific context of this time, from modern physics and in general all natural sciences, answer to a "supreme law" of scientific inquiry: the law of causality. Assuming causality as a guiding principle, modern sciences exposes the need to find a complete causal explanation; the latter consists on entering the phenomenon until you reach the last cause. This procedure of scientific knowledge is based on the mechanistic conception of the universe, where the last cause (first cause) acts in relation to an immutable law. But, in the philosophical context, knowledge would have a foundationalist character: the certainty of the cartesian "*cogito ergo sum*" would place the thought as a subjective state of inner consciousness, distancing itself from the problematic character[4] of reason as a human faculty. Therefore, the position of the subject is clear: the mind as subjective internal space would be the foundation for the construction of scientific knowledge. This concept of consciousness, not only as "subjective internal space", but also as an undoubted principle of knowledge, would initiate a process of philosophical speculation that the philosopher Richard Rorty called "epistemological turn" (2010).

In summary, the idea of a subjective internal space as the foundation of knowledge and the notion of causality[5] as a mechanistic principle of nature, allows us to glimpse a peculiar ontology of observation in modern science: the observer subject, as the foundation and cause of knowledge of nature, determines the experiential variety of the object observed from its own internal structure (mind, soul, spirit). In this sense, scientific knowledge in the modernity, would rest on the distinction between the internal (subjective) space and external (objective) reality. In this distinction two problematic arguments are assumed: on the one hand, the object's reality, independent of agency or activity of the subject; and on the other hand, the existence of *a priori* subjective rules-principles, which constitute laws of knowing, and determine the contingency of the object of experience. These last assumptions lead us to consider relevant epistemological problems in the relationship between observation and knowledge, namely, the assumption of an external reality (the subject observer) allows establishing empirical evidence (sensitive data of experience) as an epistemological condition of observation. Thus, a theory or hypothesis, to prove its truth, must be able to be contrasted with the available empirical evidence

[4] It is problematic because in medieval and ancient thought, the rational is the result of an exercise of the human intellect that distinguishes it from animals, but it is, at the same time, an exercise of the divine intellect. This leads us to questions about the distinctive features of human versus divine reason, and whose answers can lead to an unjustified, existentialist position.

[5] For Rorty (2010), the "causal metaphor" refers to the capacity of the "transcendental ego" to constitute nature. The cognoscente subject, in the free play of his faculties, has the intelligence to determine the order of the natural. Therefore, although there is something in the experience that is given to the subject; it is their faculties and representations that constitute the order of what is known, the cause and condition of the possibility of knowledge.

with it. Knowledge is reduced to its possibility to correspond with some object of the external world. In this direction, observation is reduced, then, to subjective experience and experiment, in other words, observation is determined as the subjective activity that seeks to perceive regularities in the properties and / or qualities of the objects of experience.

But the challenge of modern epistemology would be the establishment of the subject of knowledge as a fundamental condition of knowledge. In this sense, the Kantian transcendental philosophy accepts as an assumption that the object is constituted and conformed within the knowledge of the subject. This implies that the empirical object (as an object already determined by the senses as a phenomenon) must be governed by the nature of the faculties of the spirit and, consequently, that the material experience is determined by the *a priori* concepts of the subject. So, "since experience itself constitutes a type of knowledge that requires understanding and it has rules that I must suppose in me, already before the objects are given to me, those are, *a priori* rules. These rules are expressed in *a priori* concepts to which, therefore, necessarily all the objects of experience are conformed and with which they must agree" (Kant 2007, p. 21).

From this Kantian position, the observing subject acquires a central position in the knowledge of the object (observed). The knowledge of the object becomes an exercise of synthesis between representations, which are constituted as proper forms of subjectivity. Although the philosophical work of Kant was strongly influenced by the scientific revolutions, especially by the revolution of N. Copernicus in astronomy (XVI century) and by the scientific advances of I. Newton (XVII century), this Kantian position based on the "Copernican revolution" resulted in the philosophical affirmation that one can only have knowledge of the observed objects if the observer subject a priori constitutes them. Once is established this "Kantian transcendental ego" (Rorty 2010), epistemology reaches maturity, it would represent the discipline in charge of criticizing and justifying the validity of knowledge from its analysis of objective consciousness. It is for this reason that "Kant placed philosophy on the 'safe path of science' by placing the outer space within the inner space (the space of constituent activity of the transcendental ego) and then affirming the Cartesian certainty about the interior for the laws of what I had previously considered as external" (Rorty 2010, p. 132). As a consequence, epistemology would find its position as a tribunal of reason: a position from which all scientific explanation, in general, could be evaluated as true in order to meet the criterion of predictability: that is, if the subsequent observations of the phenomena explained correspond to the subjective principles and their a priori rules that constitute the knowledge of the observed object.

Faced with this epistemological position, cybernetic phenomenology starts from a different principle. For von Foerster (1991), the description of the universe implies, necessarily, the one that performs the description (observer). Hence, a cybernetic theory of observation considers two conditions in observation: "i) the observations are not absolute, but relative to the point of view of an observer (for example, Einstein's coordinate system) and ii) the Observations affect what is observed in such a way that they impede all hope of the observer in terms of being able to predict (for example, his uncertainty is absolute: Heisenberg)" (p. 64). A cybernetic theory of this kind would require, rather than a theorization of observation, a theory of the observer. Against modern epistemology, which seeks to establish the requirements of an objective-external world, independent of the observing subjects but invariant to the theoretical descriptions. The postulated cybernetic would not focus just on developing a subjective world, which is also invariant to theoretical descriptions, but in including the observer himself. From this perspective, a theory that starts from the observing subject and its function within the cognition process, is proposed but recognizing a fundamental principle: the real is a construction of the observer and, therefore, "the knowledge relationship is not a relationship between a preexisting subject and object: subject and object are products of the relationship" (Brunet and Morell 2001, p. 41).

Now, in the context of this discussion, the subsequent sections of this article aim to establish a discussion about the epistemological character of observation from cybersemiotics. To do this, the discussion will be divided into three parts with the intention to outline, in principle, a conceptual critique that later allows us to supplement the cybersemiotics requirements observation from a transcendental semiotics.

Thus, in principle, a characterization of the epistemological dispositions of the observation of the philosophy of science will be carried out from there, the theoretical progresses that the contemporary philosophy of science shows against the modem problem of the science: the split between subject-who-knows/object-known. Then, in a second stage, the observation will be reviewed from the cybersemiotic point of view. In this sense, the characteristics of the observation will be described from peircean semiosis. Hence, when considering observation within the sphere of meaning, the approaches that allow a characterization of knowledge from a non-modern phenomenology will be shown. The latter will allow us to circumscribe knowledge from a communicative, semiotic and autopoietic approach.

Finally, and as a contribution to the state of the discussion, this chapter will defend the cybersemiotic theory of observation, but considering the pragmatic circumstances of knowledge from a transcendental semiotic. In this sense, the transcendental concepts of "truth by consensus", "regulative ideal" and "community of thought" will be used to develop a pertinent theoretical field allowing to consider the transcendental conditions of the intersubjective character of knowledge postulated by the cybersemiotic.

14.2 Observation Conditions: A Review from the Philosophy of Science

The philosophy of science has problematized from different perspectives the relationship between subject- who-knows and object -known. A sophisticated variant of this philosophical framework has been enunciated in this chapter as the relationship between subject-observer and object-observed. This epistemological link allows us to consider two problematic issues: Donald Davidson (1992), "The myth of the subjective", addresses the problem of the relationship between objective and subjective. He shows that the conception of the mind as an internal space that is gifted with its own internal representations, is wrong: therefore, exist a mind thus, their thoughts and feelings would be states internally, unable to constitute a reportable content for the other minds. The fact that minds can communicate with other minds through language and that, in addition, this same language determines in a specific context which can be thought, this shows that the concept of the mind as subjective internal space (in the manner of Descartes and Kant) rests on problematic assumptions.

Meanwhile, W. Sellars (1971), in what he calls "the myth of what is given" shows the contradictions of an empiricist stance that maintains the possibility to directly know the data of experience without any prior conceptual content. Such a contradiction is, then, to propose the idea of a knowledge founded on perception: where the experience, either shows us "unique entities" (immediate, non-inferential and therefore non-relational) which are the base of knowledge, are most non forms of knowledge; or, the experience is a form of knowledge, which shows "facts", so it can be inferred from later knowledge relations. In a problematic manner, the classic empiricist assumes this dilemma as a valid reasoning. A relevant conclusion of both questions is, in any case, the recognition of language as a necessary condition for knowledge. Whereas for Davidson (1992), the meaning of the terms is acquired by the linguistic associations that are established in specific circumstances, for Sellars (1971) to determine a data of experience (as "this is colored X") implies recognizing a relation of inferential, propositional and conceptual knowledge, prior to the very act of establishing the determination of experience itself. Although, these philosophical contributions problematize the position of a subject-that-knows as the foundation of knowledge and question the transcendental character of the mind – from which the idea of an objective observer is derived; they show not only language as an element of knowledge, but also recognize context, circumstance and intersubjectivity as necessary conditions for establishing the act of knowing.

However, the epistemological problem of observation is clear when we consider the cases shown by contemporary science, especially the occurrences of quantum physics. If we examine the case of "unobservable" entities (such as the atomic and subatomic elements), the discussion about the observation becomes metaphysical. When, through certain artifacts, instruments and technical procedures, scientific representations are constructed, which in turn configure the visual character of an entity[6] -of which its existence is assumed-, then the question arises about the ontological status of theoretical entities. This approach, developed by Grover Maxwell (2010) demonstrates that there is no conclusive separation between theory and observation and, as a consequence, that there is certain continuity between observable and unobservable entities. The distinction between these two areas is arbitrary and only show the current state of scientific knowledge, but it does not says anything about the existence of the entities that are being studied. In this context, the

[6]A philosophical-semiotic version of this discussion is developed in Horta, J. (2013). *Scientific language: problems of iconicity and meaning in the representations of Biology.* Master's Thesis. National Autonomous University of Mexico.

hypothesis is clear: eliminating the theoretical terms does not remove the existence of unobservable entities; therefore, if the theories have explanatory success, it is because, in the end, the entities to which they refer to really exist.

The question of the existence of theoretical and unobservable entities shows us a perspective about observation: namely, the demarcation of the observable as the basis of scientific knowledge and, also, the theoretical conditioning of observation. This last point has been widely developed by N. R. Hanson (2010), for whom observation necessarily involves an interpretive vision sustained by previous knowledge: that is, the vision involved in observation has as *a priori* transcendental condition prior conceptual content that Hanson called "perceptual theory loading". In this sense, the theoretical load is the knowledge prior to the experience that conditions the apprehension of the observed object (see of perception: "see as") and, likewise, determines the formal identification of the said object within a framework of prior knowledge (see of knowledge: "see what"). Therefore, the knowledge view constitutes the form of the object observed from a language, which allows the conceptualization of the object and, simultaneously, prevents its subsequent reidentification, building a range of expectations (learned knowledge) that will condition subsequent experiences. Therefore, "to see an X object, is to see that this object can behave as we know that the X objects behave. If the behavior of the object does not match what we expect from an X, we will be forced to not see it, from now on, as an X" (Hanson 2010, p. 242).

When Hanson (2010) admitted the transcendental Kantian postulate, he accepted that the interpretative vision is *a priori* to experience an experience of knowledge, but does not justify the position of a subject-observer transcendental. Instead, he recognizes that the observer faces what is observed through the mediation of a conceptual language that allows him to configure the observational experience. Consequently, observation is a process formed simultaneously by two operations (vision-interpretation), in which images and sentences are linked to determine the character of the observed object.[7] The recognition of language and previous knowledge, as a priori conditions of observation, are not foreign topics in the epistemological discussion of cybersemiotic theory. Furthermore, this area of reflection has been revised from the semiotic realism of C. S. Peirce. So, based on this realistic position, cybernetics – and consequently cybersemiotics – would carry out a theoretical characterization of observation that would include an element that, within the philosophy of science, has been left outside the scope of speculation: this is the "reflexive" and "self-reflective" character of knowledge, where the observed object can only be defined from the observation of the observer itself, within a system that allows its coexistence. This last statement requires considering a perspective that is not based on the epistemological separation between subject/object, neither in the fundamental opposition between internal mental space/external world. The

[7] An epistemological critique of Hanson's approach to observation is in the text: Magaña, M. and Horta, J. (2016). "Towards a notion of interpretation in science: critical annotations to the approach of NR Hanson". *Interpretation:* hermeneutical journal of the Institute of Philological Research. 1 (2) 89–118.

philosophy of science, in this sense, has not been able to clarify this formula of modern thought and, in any case, it has made a problematic defense of this supposition. In the words of Brier (2016), "this means that the model of the world out there, produced by empirically grounded science, lacks of an integrated reflection precisely of that cognitive structure within our embodied mind that produces science" (p. 212).

14.3 Semiotics and Cybernetic Conditions of Observation

To justify the cybernetic position, peircean realism has provided different approaches that seek to answer the causal relationship involved in modern scientific knowledge. In this section I will explore some of these approaches, trying to define some of the foundations of cybersemiotic epistemology. Now, in a fragment entitled "Principles" (1861),[8] Peirce outlines in a schematic way his concept of knowledge, in a brief exercise that tries to contrast his position against traditional epistemological notions. For Peirce, the primordial problem lies in the "nominalist" character of the previous definitions, since this position assumes the existence of unknowable things-in-itself and, therefore, determines knowledge itself as a "*medium quod* ", namely, as the means through which you can only know the effects of things on one's conscience, and not the things themselves.[9] From a pragmatic perspective, the process of knowledge is interpretively different (but not necessarily opposed) to modern epistemology. In this sense, Peirce affirms: "(1) There is the soul; (2) There is the field of consciousness in which we know the soul; (3) There is the thing in which one thinks (*thought of*); (4) There is the real power of the thing that is exerted on the soul; (5) There is the idea or impression that the thing leaves in the soul; (6) There is thought or idea as it appears in consciousness" (Apel 1997).

It is interesting at this point to make some brief considerations regarding this fragment (cited by Otto Apel, but referred to and recovered by Murphey 1961). Therefore, the following lines will outline some readings related to the theoretical foundations of cybersemiotics. In a more deterministic sense, it is pertinent to highlight Peirce's distance from the modern epistemology suggested from the conceptual order that arises in his definition of the causal relation of knowledge. According to this, the idea of posing the notion of "soul" as part of the first affirmation of existence leads us to consider, from the beginning, a different theoretical position,

[8] Text cited by Otto Apel (1997) as a footnote (67), on page 118.

[9] For the North American philosopher, the nominalist theory of knowledge, in general terms, establishes the relation between subject-cognizer and object-known from the position of the Subject. The causal relationship is established as follows: (1) There is the Subject, the Ego, where the thing is known by virtue of an affection of the conscience and only through its effect; (2) the "noumeno "(thing in itself) exists, and is unknowable; (3) the object or thing as intended; (4) There is the phenomenon, as an affection of the conscience; and (5) There is a causal relationship between object and phenomenon. Cfr. Text cited by Otto Apel (1997) as a footnote (67), on page 118.

for the author (1997, p. 112 and ss) "soul" is a notion that implies will, desire and possibility of choice in relation to ends. Thus, for the anglo-saxon philosopher, unlike the epistemological tradition, the process of knowledge begins with a first state, comprehended by desires and choices, which condition the original perception of experience.

In this peircean position, an important distance is highlighted: the step (1) of knowledge does not affirm a "*tabula rasa* " (Hume) or a "subjective *a priori* structure" (Kant), or a "mind" (Locke, Descartes); that is, it does not affirm the position of a meta-theoretical subject whose initial function is to conform as a "receptacle" (Rorty 2010) of sensory stimuli. On the other hand, the pre-pragmatic definition[10] of knowledge affirms the existence of a soul that chooses and desires, and that at the same time behaves with respect to specific ends. In another sense, the existential affirmation (2) raises the possibility of a space of knowledge that, following Kant (2007), has to do with the sensory perception of the known object. But, for Peirce, this space is not internal-subjective, it is literally a "field", as an internal and external sphere of consciousness, where the perception of the object of knowledge is shared (as external). This leads us to the Peircean idea of "alterity", as a relation of representation of the object in which experience alters the state of knowledge. This alteration occurs within the intersubjective sphere, that is, the common space of knowledge that constitutes the total of the collectivity.

The existential affirmations (3) tend to (6) recover an aspect of transcendental philosophy, namely, the position of thought as a *priori* condition in the constitution of the object of knowledge. But, Peirce approaches it from a realistic position, where what is coherent and consistent with opinions, habits of thought (interpretative) and beliefs is true[11] of a community; in this sense, what is true is, for this philosopher, what constitutes reality. Therefore, he argues that "this great law is embodied in the conception of truth and reality. The opinion intended to be the one with which all those who investigate will finally agree is what we understand by truth, and the object represented in this opinion is the real thing, that's how I would explain reality" (Peirce 2012, p. 186). Now, the existential affirmation (4) and (5) reiterate the communion between Peirce and the epistemological tradition, since both recovers the cognitive function of experience and perception. However, this function is not primordial, but in any case it is a consequence of the thought that a priori determines the existence of what can be thought. But, these statements propose a problematic field tied to a long philosophical discussion within the philosophy of science: the existence of a reality independent of the cognition of the subject. Precisely, statements (4) and (5) allow you to sustain the existence of some

[10] It is said "pre-pragmatic" because Peirce's philosophical questions about modernity were made before the consolidation of his pragmatic stance; but these same questions were the foundation to justify that philosophical position.

[11] In Peirce (2012), a belief is an interpretative habit elevated to the law of thought: that is, a habit that has been confirmed by a community and that conditions the ways of understanding and interpreting the world for the members of that community.

independent to the subject (external to their thoughts and will), but bound by continuity with their desires, choices and modes of knowledge.

To sum up, this characterization of knowledge – which is necessarily dynamic in Peirce, contains two fundamental realistic conceptions. On one hand, accepting Cartesian reasoning, recognizes the existence of the soul (mind) and its field of consciousness (thought); but in addition, it recognizes the existence of an independent reality of the soul, the thing in which one thinks (*thought of*) but that is linked by continuity to thought. This notion allows establishing the bases of a semiotic realism, within which, the existence of the thought is accepted from its manifestations concretized in signs. Signs constitute evidence of the existence of other minds and, hence, true and real knowledge are determined by the link between thoughts through signs. On the other hand, the possibility of a semiotic realism makes it possible to understand the scholastic realism of Peirce. Rather, says the American philosopher, we must recognize that the real: "An external reality is one whose characters are independent of how you or I think. However, there are phenomena within our own minds, dependent on our thinking (...) But although their characters depend on how we think, they do not depend on what we think those characters are." (Peirce 2012, p. 184). But, if the real thing is other thoughts (different from the self), and at the same time independent of a particular thought, then the real is a thought of generality. In other words, the peircean scholastic realism recognizes the reality of universal abstract concepts. Thus, from this approach, the real does not necessarily imply empirical existence, for which the American philosopher accepts the reality of the "general types" (*types*) and their "particular instances" (*tokens*) as concrete manifestations of thoughts.

This is precisely the foundation of the dynamic and progressive conception of knowledge in Peirce's realistic epistemology. Within this position, there are three instances of knowledge: "*Tychism*" main attitude of speculative thought, which involved recognizing the indetermination of existence, accepting the probability and absolute chance as a constituent part of knowledge; "*Synechism*", the acceptance of the continuity between ideas-thoughts, which led to recognize in continuity a greater degree of understanding of the universe, and finally, "*Agapism*", which is the tendency towards *filia*, understood as the tendency towards fraternity and community. This characterization of knowledge would have relevant consequences in the determination of observation from a cybernetic point of view - perhaps one of the most relevant epistemological links is in the relationship between pericean synequism and the second order cybernetics.

Rather, it is important to point out that observation, a the cybernetic point of view, is based on the concept of "reflexivity", that is, in the relation of mutual involvement between the observer and the observed, within which a process of mutual coexistence arises. For Pablo Navarro (1989), this does not imply leaving aside the objectivity of knowledge, but, rather, considering a reflective objectivity where "the object overflows and includes in its radius of action the subject, who must thus give an account of himself in the terms of what is a product: the objectivity built by it" (p. 93). From the cybernetic and semiotic point of view, the observer is not a subject, it is a system; a semiotic system that is determined by sign conventions and, in turn, determines its environment from conventionalized signs. These conventionalized signs condition habits of interpretation and beliefs, which in turn determine the way in which the observer positions himself and builds his environment. Therefore, "an observer is a semiotic system capable of producing habits or rules of action where it produces itself and its environment through the production and understanding of signs for which it has been programmed biologically, cognitively or artificially" (Vidales 2013, p. 123). Within this perspective, the observer, as a system, is himself the limit of his own knowledge of reality, which he has constructed for himself phenomenologically.

Hence, in second-order cybernetics, the reflective nature of observation implies a recursive process where observation and observer presuppose and mutually determine each other. The construction of meaning by an observer (as an observer system/semiotic system), involves the establishment of a set of signs, through which the observer constructs the surrounding reality (environment), as well as his own reality (thought). Therefore, cybernetics "turned on itself and used its concepts to see the users of these concepts and the relationship that through these concepts established with their environment" (Pakman 1994, p. 26). But the observer not only determines the environment from his own observation, but also observes another observer (which is also an observing system/semiotic system). This implies a relationship of knowledge where observers know the way in which other observers know, within a certain "domain of coexistence" (Maturana 1996, p. 76). Therefore, observation is not only reflective, but self-reflective: it is the condition of possibility of a recursive observation where observers observe themselves and others, within a community of observers, in a process of mutual recognition.

This relationship of coexistence occurs through the effect of language: where human beings, as observers, are constituted in living systems through language. In this process of language, the observer constitutes itself as a part of a domain of experiences and explanations, where it configures itself as an observer belonging to a community. Therefore, "human beings exist in language, and our experience as human beings is carried out in language in a flow of consensual coordination of actions that we manifest in language" (Maturana 1996, p. 96). Although the cybernetic presupposition of the coexistence between observer-observation-environment seems to dialogue with the positions of the philosophical hermeneutics, and suggests an extensive application of the hermeneutical concepts of "being-in-the-world" (Heidegger 2009) and "fusion of horizons" (Gadamer 2012); as well as the character of "linguisticity" of language in its ontological evolution to understand the being-other; I consider that a relevant reading of the conditions of possibility of cybernetics is in the peircean synequism and semiotic realism. Following this last suggestion, the condition of an observer to observe another (observer) from his own observations is the possibility of accepting the continuity of ideas-thoughts among members of a community.

This supposes accepting the synequistic quality of knowledge, where the thought-ideas of observers tends to affect other thought-ideas, producing generality in the understanding of the universe, allowing the generation of a non-particular consciousness. The latter makes sense if one accepts, in addition, that thought-minds exist from signs, which they share as evidence of their own existences. For that reality, the reality of an objective world (the observed) is determined by the continuous quality among the general ideas (whose reality is defined by the principles of scholastic realism), which are continued and shared through signs among the thoughts of observers who are members of a community. Finally, this allows us to affirm that the reflexivity and self – reflexivity of observation, based on semiotic realism and peircean synequism, guarantees a field of constructivist speculation within which, the real is a construction of the community of observers who share ideas and languages, through which they determine their environment and, likewise, determine their own reality as observers. According to this last affirmation, human beings construct an objective world in a rational way, but, recognizing that "rationality is not a property of the observer that allows him or her to know something independently of what he or she does, but rather it is the operation of the observer according to the operational coherences of *languagin*g in a given domain of reality. And consequently, there are as many domains of rationality as domains of reality produced by the observer" (Maturana 1996, p. 35).

This cybersemiotic position (made from the bases of the semiotic phenomenology, hermeneutics synthesis and systemic perspective) allows us to understand the phenomenon of observation, beyond the epistemological problem of the base as the foundation of knowledge. In synthesis, this leads us to consider knowledge as a result of the relationship of continuity of an empirical existence that underlies the postulated reality by the theory. This existence (as independent human agency order) is accessible to knowledge through "judgments of perception" that constitute the epistemic states on which subsequent guesses of knowledge (hypothesis) will be made. The cybernetic continuity between observation-thought-existence is a necessary condition for the contemporary definition of knowledge, and allows us to question the subjective nature of science postulated by idealistic, empiricists and nominalist philosophies.

14.4 Cybersemiotics and Phenomenology from Transcendental Semiotics

This last section seeks to close this review by suggesting some epistemological questions involved in the cybersemiotic theory. Of course, this exercise is not exhaustive, since it does not intend to revile the epistemological contributions of the theory; rather, it seeks to construct a space for philosophical exchange with respect to some relevant topics within that theory. On the other hand, it seeks to contribute to the discussion from the point of view of transcendental semiotics, recognizing some interesting contributions from a different reading of Peirce. Now, within the emergent hierarchical levels of semiosis, described in S. Brier's (2008) cybersemiotic proposal, the fifth level corresponds to the emergence of self-consciousness: namely, where human consciousness is constituted as self-consciousness, through language and logical-rational thinking. At this level of semiosis, human consciousness is determined as a consciousness of signs, which allows us to observe and infer the regularity of nature through language, with which the human mind can recognize this regularity.[12]

At the center of the "cybersemiotic star" model (Brier 2016), there are autopoietic social semiotic practices, determined by the relationship between language and consciousness. This relationship is not reduced to the internal consciousness of an "I", within a relationship of scientific knowledge pre-established by the conditions of language. If not, rather, it postulates a process that implies the affirmation of an earlier consciousness: that is, shared experiential consciousness as I experience (temporal and perceptual) prior to language and science. However, despite the intuitive metaphysical nature of this approach, a phenomenology of this nature can only be sustained on the postulate of an objective reality, independent of the human mind and closely linked to the field of experience.

From the start, the cybersemiotic phenomenology is based on the distinction between Umwelt and Lebenswelt. According to Deely (1996), Umwelt is "the phenomenal universe, the part of the environment that an organism selects through the specific senses it possesses and that constitutes its private world" (p. 63). The term encompasses the notion of species, not individuals, in such a way that this private world does not imply the concept of subjective internal structure proposed by Kant, but rather the set of relationships that are on the one hand dependent on one mind and, on the other, independent of the entities. This private world is also an objective world, since it includes "everything that exists in some way as known" (Deely 1996, p. 177). Hence, the Umwelt as objective world is a "semiotic plot" (in terms of J. Deely) that not only implies the living world, but also the physical world existing within the scope of experience. Each semiotic plot assumes a center, closely linked to other centers, articulating a network of shared knowledge that goes beyond the embodied subjective experiences, and that as a warp of symbolic relations (that is, of meaning) constitute the criterion of objectivity of the known. Faced with this definition of Umwelt as a phenomenal universe, the Lebenswelt constitutes the social world, determined by cultural and social acts. Following Deely's nomenclature, it is a specific variation (typical of the human species) of the Umwelt, common to anthropoid beings. This last phenomenological scope corresponds to what Deely calls "anthroposemiosis", that is, the scope that circumscribes the sign processes of the human species, as well as the sign systems that structure human perception and modify its environment. Therefore, the Lebenswelt is a microcosm that is part of a more complex macrocosm (Umwelt).[13]

[12] Brier describes four other levels of semiosis that precede the level of self-consciousness: (1) the level of causality constituted by quantum fields; (2) the physical level of kinematics and thermodynamics; (3) the proto-semiotic level of objective information determined by empirical patterns; and (4) the level of self-organized life that corresponds to living systems (Brier 2008).

[13] It should be noted that this approach is relevant in the field of traditional semiotic studies, which assume that verbal language is the primary modalizing system. However, from the perspective of Deely, verbal language is just another of the systems of modalization of the world, and for that reason it is a rather secondary system: the author considers the existence of processes and systems prior to the linguistic description of the world (Cf. Deely 1996, p. 90 and ss)

Within this idea of independent objective reality, the established experience of anthroposemiosis is a plot that links linguistic semiosis with shared semiosis of other species: that is, it constitutes an "endosemiotic" network embodied in the different levels of consciousness. In broader terms, the anthroposemotic experience establishes the interaction of human beings with the physical environment on three levels: namely, linking them with their co-specific (other human beings), with other animals and, finally, with different physical environments. This allows us to justify an interesting phenomenological approach: anthroposemiosis is a set of relationships that constitute a totality-unity between the natural physical environment and the human.

Following the path proposed by Deely (1996), observation in experience involves looking at the complexity of the objective world from the particularity of anthroposemiosis: in other words, this observation involves looking at the macrocosm from the Lebenswelt, which, in principle, looks himself as a microcosm, while observing the complexity of the semiosis of the Umwelt. Therefore, "anthroposemiosis is the most complex form of semiosis (…) because it houses all the other semiósic developments at the same time and depends on them to achieve what is unique and specific to itself, starting with language" (p. 92). In this theoretical framework, the observation of the objective world implies, primarily, assuming the reality and existence of that world in order to subsequently make this observation from the specificity of the human species. This observer-observed relationship, the observer must necessarily observe that observe his own objective-private world (his own Umwelt) so that, from there, he can observe the other objective world. The latter assumes two conditions in observation from semiotic and cybersemiotic phenomenology: a) the observer is a species, not a particular entity or individual; and b) what is observed is a life grouping different from the co-specific group of the observer.

In methodological terms, the human species deals with the observation of the semiotic levels of the Umwelt from the limits of its own Lebenswelt. In this sense, the possibility of approaching knowledge of the observable objective world is realized from human experience: where the basic notions of Umwelt can only be derived from human experience, that is, only from what can be stipulated from the human, where the objectivity of this experience is the foundation of the common structure of the whole field of unknown empirical knowledge, unobservable and that is determined as "specifiable" *a posteriori*. Now, following a different reading of Peirce, Deely (1996) proposes that every method presupposes a degree of semiosis, since semiosis implies emergence of meaning and, also, a process of revelation where each method shows something of the world. Particularly, it seems a plausible risk to consider that cybersemiotics, in its different characterizations of peircean semiosis, may not recognize in his method that it is only a point of view, whose nature is semiotic. In this regard, Brier (2016) advances a justification,

> This transdisciplinary framework posits, first, that in order to produce intersubjective knowledge like *Wissenschaft*[14] it is necessary to accept the reality of language, embodied autopoietic minds, the culture and the non-cultural environment; and second, that the discussion on transdisciplinary knowledge takes place in a semiotic-linguistic discourse with other embodied and linguistically informed sentient beings in a common praxis that combines non-culture with the cultural spheres of meaning (p. 184).

This statement leads us to identify two relevant problems within the cybersemiotic theory. On the one hand, the formal circularity of the argument allows us to infer the ontological objectification of theoretical concepts. Among other implications, suggests problematically that for the effective realization of a transdisciplinary knowledge, the conditions and elements that make up the transdisciplinarity must be accepted. With this, it seems to assume the objective existence of such elements and conditions, accepting that they are existing entities and not concepts that come from a specific form of the theoretical language. In other words, cybernetics falls on the problem of the ontological objectification of their concepts, which means that to recognize the reality that suggests the theory is a necessary condition to accept the existence of the theoretical entities posited. Existence for which is not required any empirical demonstration. In the argumentative logic of this passage, the ontological objectivity is an inevitable consequence: it is a necessary resource to escape the circularity of the argument, which sets out to accept an intersubjective knowledge (defined by the same theory), before we must accept the conditions (nominated by the same theory) which determine such knowledge. Thus, the ontologizing of theory takes back us to the problem of the foundations of knowledge; this question constitutes a perspective inherent in postures idealists and empiricists.

It is not idle to try to answer the questions that the philosophers of science have peered into the different epistemologies that tend to be constituted as phenomenologies or ontologies. For example, for Rorty (2010), the problem of a phenomenological approach is a confusion between metaphysically determine which components or units are knowledge and, on the other hand, what are the organic conditions necessary for construction of knowledge. Following the pragmatic dissertations of Rorty (2010), the idea of an observation that presupposes an objective-shared world constituted by sign networks, although it allows to overcome some of the contradictions of Kantian idealism and modern epistemology (such as the idea of a space subjective internal as a necessary condition of knowledge), however fails to avoid some of the common places in which the critique of a phenomenology has stalled. In the following lines I will outline some philosophical discussions involved in the cybersemiotic position as phenomenology. But, it must be limited, it is a philosophical reflection derived from the very concepts with which the cybersemiotic theory is based and described, this means that the reflections made here constitute a level of metatheoretical research, which seek to gain explanatory capacity about the conditions and foundations of cybersemiotics.

[14] *Wissenschaft,* is a German term that refers to a systemic scientific study. The dimension that Brier (2016) makes continues in this direction: a term of science that covers the field of exact sciences, social sciences, humanities in the same world. Cf. Note 5 of the cited article.

In principle, presupposing an objective world leads us to consider the epistemological problem of "privileged access" (Rorty 2010, p. 104 and ss): where the researcher seems to have immediate access to the order of the objective world that results in counterintuitive arguments in relation to the common sense and the beliefs of a certain community. This privileged access implies that there is a necessary logical connection between the internal states of the mind (or the minds-community), the behaviors of the subjects of existence, and the primary sensations that come from the perceptual relation with the objective world. Although the notion of semiosis allows to think a different definition of knowledge determined as a network that constitutes the sign space of shared information and, therefore, objective; in any case, this position does not solve the problem of the connection between an internal state as mind or thought and an external state as a set of sensations (although objective for the reasons explained).

Moreover, the cybersemiotic concept "perception as a first in pure state" (Brier 2016, p. 188), is a sophisticated version of the philosophical idea of "primary sensations", and consequently seems to refer us to the phenomenological problems involved in the latter concept. For Rorty (2016, p. 30 and 90), the problem lies in establishing a report about the phenomenal properties of these primary sensations, as this leads us to consider the representational content of a sensation already signified; content that can be contradictory: well, certainly, the content derived from a primary sensation can be representational-intentional, with phenomenal properties (at the level of thoughts or mental images), or representational-intentional without phenomenal properties (when we talk about beliefs). From another position, but in a contradictory way, the same primary sensation can derive an unintentional and simultaneously non-representational content, constituted by phenomenal properties (like other sensations and perceptions), or without phenomenal properties (the purely physical). The relevant question is that, from Lebenswelt itself, we do not have any observational resource that allows us to determine and justify the process of occurrence of the different internal states derived from a primary sensation.

From a semiotic point of view, semiosis as the action of signs can be a theoretical foundation that allows us to overcome the previous epistemological problem. However, considering a community of interpreters linked in a semiotic network, the knowledge of the world as objective-shared leaves aside a problem about the phenomenal properties that constitute such knowledge: namely, one of the problems pointed out by S. Kripke (1972, p. 339 and ss) with respect to the "epistemic situation". To consider the dilemma of the evidence of a primary sensation within the process of knowledge implies that, in any case, for an observer (X) to have the same primary sensation as another observer (Y), he must have been in the same epistemic situation of perception (that is, being in the same time / space), which is ontologically problematic. If this were not the case, then either you do not have the same feeling (and each one refers different things), or you are generically designated (through a "rigid designator") the same object-experience in every possible world.

The latter leads us to affirm, together with Kripke (1972), that a physical state does not necessarily identify with a designation and, therefore, one can speak of the designation and the designation without correlating it with a specific physical state.

Hence, to speak of a primary or primary sensation implies falling into an ontological and epistemological relativism: where a community of knowledge, as a community of interpreters, does not share objective physical states, but only specific ways of designating them from of shared expressions. In this relativism, Kripke's sentence is interesting to evaluate the cybersemiotic theoretical concepts: phenomena can not be discovered in the same way and all are relative to the epistemic situation of the observing subject.

A phenomenological position could imply the problem implicit in the ontological character of a theory, namely, that a theory conditions a type of observation. In this sense, observing the semiosis or autopoiesis as terms that describe and condition the observation of a certain reality could return us to the problem of the circularity of knowledge. Together with Feyerabend (2010), is possible to agree on a pragmatic theory of observation, which makes it possible to accept that the inspection of phenomena is necessarily conventional, and therefore, knowledge is constructed in the confrontation between theories and in the interpretation of properties observable from the set of knowledge accepted by a community. In this order of ideas, cybersemiotics is an interesting set of alternative theories that build the base of a theoretical pluralism focused on constructing a theoretical reality susceptible of being interpreted.

Thus, it is important to make a first warning: together with Deely (1996), we accept that semiotics, and in fact any method or theory, necessarily constitute a "point of view". This means that there is a problem of objectifying the method or theory used to describe reality. This objectification of the method or theory implies ontologizing the sign process that bases them. Understanding, the question for Deely consists in considering the method or theory as an "ideology", in which theoretical "ideas" are considered to be " self-representations " that show themselves, that have existence in themselves and that, therefore, are objects that must correspond to some kind of reality. However, the semiotic realism of Peirce had already suggested to us that some general concepts have reality, independent of particular private ideas (of individuals, for example). But, accepting this scholastic consideration would return us to the modern problem of the correspondence between ideas-concepts and reality. A solution, in the first instance, is suggested in the neoplatonic character of Peircean realism, and in the assumption of the existence and reality of thoughts. But, in any case, this supposes that reality must be the end of the philosophical investigation, not the foundation. In other words, demonstrating the universality of a concept is the end of inquiry because in principle we can only assume that both ideas and concepts are artifices of a language, in which, signs are part of a specific code and, for that reason, are objectively different from ideas and concepts as representations.

In another order of ideas, Brier (2016) states that "cybersemotics constitutes a realistic foundation for the comprehensive understanding of the natural, life and social sciences as well as the humanities and that can provide a deeper understanding of the differences in the type of knowledge they produce, to show why each of them is necessary" (p.183). Indeed, this fragment invites us to consider the epistemological nature of cybersemiotics, which is limited to the problem of modern epistemology: that is, the arbitrary character of a field of thought that is positioned as "First philosophy". This is the reason of why it is assumed as responsible for explaining how knowledge arises and what elements comprise; as well as what are the necessary and sufficient conditions that determine knowledge as valid. The epistemological problem involved is to impose a philosophical language on the task of science, where it *regulae philosophandi* is a necessary condition for scientific knowledge.

Moreover, the problem is exposed if one considers the pretention to constitute cybersemiotics as a "realistic foundation for understanding" (Brier 2016). However, the terminology does not dispel the foundational character of the cybersemiotic perspective. If we accept a foundationalist position implicit in cybernetic and cybersemiotic epistemology, we should recognize two derived problems: on the one hand, that systemic, cybernetic and cybersemiotics concepts rest on the basis of beliefs that are not evident (for example, assuming reality of semiosis) and, therefore, its epistemic validity must be demonstrated before; and on the other hand, it is not clear what knowledge is derived from basic beliefs and therefore they are just justifiable within a knowledge framework. To conclude this series of questions, it would only be left to say that while cybersemiotics postulates perception, and the first involved in it, as parts of the knowledge process, this same thing take us back to the epistemological problem of foundation. It is not trivial that Brier himself seeks to propose his cybersemiotic theory considering the possibility (plausible, of course) of establishing the foundations of knowledge. Therefore, the underlying issue in this is to sustain the confusion between perceiving-knowing.

Knowledge that pretends to be or have foundations is based on maintaining that there is an empirical element that determines knowledge, and this has the consequence of considering objects as necessary entities that are imposed on thought. Hence, thinking about the foundations of knowledge is a natural reasoning if knowledge is defined as the relationship between mental entities and entities of a different character (for example, empirical); and from here, having a foundation of knowledge implies being able to discern the necessary from the contingent. I think that semiotics itself is a response to this approach. The possibility of the signs to represent unimaginable objects (such as ideas or numbers), in the sense of not having a correct observation-image of the object, represents a challenge to modern epistemology: because this reasoning derived from Peirce allows us to define a broader and more complex concept of "knowledge", where thought is not necessarily related to the entities that result from observation. Thereby, we can think of theoretical or metaphysical entities, which are objective as knowledge shared by a community, but do not correspond to observable facts.

Finally, one important point to review is the ontological bases of cybersemiotics. I agree with Brier (2008), on the fifth ontological level, because it allow us to understand why the new foundation of knowledge is in intersubjective communication and organized cognition autopoietic and semiotically. But it is at this point that I want to sustain the need to raise cybersemiotics on the basis of transcendental conditions. The belief of truth, from the point of view of the *Wissenschaft*, not only maintains an ethical commitment, but also an epistemological one, that is, a commitment to the truth of our knowledge. This belief in truth is maintained on the basis of the Kantian “regulatory ideal”, that is, as a purpose that determines actions and guides practical objectives. But, from a transcendental semiotics, a definition of truth can be established that, as an ideal regulative, is constituted as a transcendental condition of knowledge within the scientific conception of the *Wissenschaft*.

In other words, cybersemiotics would have a strong argument if it postulated the distinction between Umwelt and Lebenswelt, not as a theoretical foundation (which would imply returning to the philosophical discussions described above), but as a hypothesis to be proved *a posteriori*: namely, as a metaphysical affirmation not verifiable, but that would work as a regulative ideal that determines the end of scientific research. This forces us to describe the transcendental nature of this statement and explain how it could work at the level of a cybersemiotic phenomenology, but without returning, once again, to the epistemological problems derived from Kantian idealism. But if we accept the nature of transcendental conditions as conditions of possibility of knowledge (according to Kantian philosophy), we could think from this point forward of some transcendental conditions as necessary for the constitution of knowledge from the cybersemiotic theory. In the first instance, one condition is to recognize the metaphysical nature of cybersemiotic theory, but in the sense of “metaphysics” from the perspective of P. Feyerabend (2007), in which metaphysics correspond to the knowledge that is not validated by the empirical basis of verification or observation. Both the distinction between Umwelt/Lebenswelt, as well as the levels of the cybersemiotic star, can be held as non-observational entities, nor committed to empirical verification, but which, as epistemological purposes, are ideal that science seeks at some point to be able to show. Hence, its explanatory power is not to describe an empirical world, but the opposite, it aims to describe a possible world that tends to trace a probable path of investigation.

This metaphysical position makes sense within the framework of a transcendental semiotics, since the metaphysical terms and concepts are not in correspondence with their empirical verification; in any case they function as symbols that make sense within a community of researchers-interpreters. The reality of this metaphysics lies in its character as a regulative ideal: it allows us to think about the world in a different way as the world presents itself to observation. This leads us to conclude that, in any case, it is thought that determines knowledge, not observation or its epistemological derivatives. Thus, a condition of metaphysical terms, seen as symbols within the discursive apparatus of cybersemiotics, is to determine its phenomenological functioning as non-verifiable regulative ideals, but which determine a set of actions within a community of researchers. Now, the criterion of validity of these metaphysical approaches involves proposing a notion of truth derived from a transcendental semiotics. This concept of truth involves the challenge of overcoming the ambiguities of the scientific truth postulated in modern epistemology, which is based on the correspondence relationship between scientific theories and the empirical basis of experimentation.

This theory of truth must take into account two levels of knowledge. In principle, you should be able to establish a “harmony” relationship with the evidence to determine a correspondence relationship (be able to establish relations of semantics of correspondence between sign and object); but, in a second term, you must be able to constitute a pragmatic function that includes the linguistic interpretation that makes possible the intersubjective link in the context of reasoning. According to that, a theory of truth with a semiotic foundation has, consequently, to contemplate three sign functions: an indexical function that directs the attention of the subject in a linguistic way in the given phenomena; an iconic function that establishes the being-so of phenomena by means of the introduction of predicates; and a symbolic function, which enables the adequate use of conceptual signs that enable the intersubjective validity of knowledge.

As a consequence, a semiotic theory of truth must combine the semantic correspondence of the phenomenal evidence (object-sign) with the subjective interpretation that makes intersubjectivity possible. This suggests that, in the end, knowledge is consolidated from linguistic interpretation. For Apel (1991), and following his reading about Peirce, the phenomenal evidence of the object does not guarantee the intersubjective validity or the certainty of knowledge of something. For, in any case, "without the linguistic interpretation adequate to the phenomenon in relation to abductive reasoning, the pure phenomenal evidence for the correspondence of intentional compliance is not yet, at all, an evidence of knowledge" (p. 51). Hence, for this truth to make sense, intersubjectivity could not be determined as an a priori condition of knowledge; rather, it must also be considered as a regulative ideal based on Peircean *agapism*, that is, in evolutionary love through a final cause of the harmonic order that allows to establish unity between Individual-Community and consequently the unity between Community-Nature. So, if we accept this semiotic description, it is necessary to recognize that both thought and knowledge are activities that are conditioned, carried out and happen to occur in the community: because semiosis, like the sense of the signs, does not configure an individual thought, but a thought that is significant in the community.

This would allow us to postulate a notion of truth relevant to a cybersemiotic position of knowledge: i. e. a notion of truth in which cybersemiotics do not rest in a foundationalist and metaphysical position; but to recognize the nominalist and semantic character of its theoretical postulates. Now, and to develop this question from a transcendental point of view, Apel (1991) considers that a pragmatic truth necessarily implies the existence of a context of practical verification to determine the truth of sentences or statements. In Peirce, this context of verification occurs within the framework of an unlimited community of interpreters. This criterion proposes different characteristics that define the functioning of a community of interpreters. In the first place, it is assumed that within the community a moral "self-surrender" occurs (Apel 1991, p. 68 *et seq*), where the interpreting members of that community have subordinated all their interests (social and individual) to the interest of seeking the truth. In this sense, the verification of hypotheses and beliefs, within this context, can be established as a proof of the capacity to constitute a consensus through arguments.

From this perspective, Apel (1991) proposes a pragmatic-transcendental theory of truth as consensus, based on the limits of a community of interpreters. But, as a condition of demarcation, it should be noted that this consensus is made on the criteria of truth available by the community itself. This leads us to infer that, from Peirce, the current state of knowledge is proposed as a criterion that regulates the determination of truth and the validation of sentences that retain the quality of truth. Thus, as a third condition to regulate the practical verification of the notion of pragmatic truth as consensus, Kant proposes the relevance of a "regulative ideal" that delimits the practical scope of the concept of truth. This regulative ideal is proposed in two ways. On the one hand, in the idea of a "quasi-institution" that shapes the community of interpreters as an unlimited intersubjectivity destined to propitiate the non-forced rational consensus; and on the other, the very idea of rational consensus as a conviction, which is proposed as the end that regulates and disposes the actions of the subjects of the community, but in fact, as an ideal regulative, it may be the case that this conviction is not perform de facto.

According to this, the idea of a truth as consensus leads one to consider (together with Otto Apel) the meaning of scientific research from an ideal regulator, in which a community of interpreters (researchers, scientists), community unlimited and in ideal conditions, could reach "in the long run" an intersubjective opinion that is valid for all members of the community; and that it is not debatable based on the truth criteria available within the same community. This hypothetical possibility allows us to infer, but now together with Peirce, that the intersubjectively valid opinion must be (for the members of the community in question) identical to the truth, as intersubjectively valid opinion; and for that very reason, on the ontological level, this truth has to be the adequate representation of the real. Finally, these transcendental conditions differ from the cybernetic conditions in which observation and knowledge are postulated; namely, inasmuch as for a transcendental semiotic stance they are conditions that do not imply a necessary reality or a concrete realization. Hence, the idea of a truth by consensus and a community of interpreters, such as transcendental semiotic conditions of knowledge, would allow positioning the approaches of cybersemiotics from a non-realistic setting that implies some of the epistemological problems reviewed in the previous lines.

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Chapter 15
Storytelling and Cybersemiotics

David M. Boje

Abstract My purpose is to put Brier's cybernetics in a more integrative relation to my own theory of storytelling. The main argument I want to make is that it is time to integrate storytelling into cybersemiotics. On the one hand, cybersemiotics integrates cybernetics of von Foerster, Maturana, Varela and especially Luhmann with Peirce's semiotics. In cybersemiotics, living organizations constitute several kinds of autopoiesis and each produces Peircean experiential social-biological interpretants as aspects of life worlds. On the other hand, storytelling also inhabits the life world 'living story' relations along with the culture world of retrospective narrative, and antecedent processes I call 'antenarrative' (preparing in advance before narrative and stories). The few storytelling references in previous cybersemiotics publications has treated storytelling as language games with semantic content. In this chapter I want to point out ways that storytelling is sociomaterial, biological, and cybersemiotic, and not merely linguistic or cognitive.

Keywords Storytelling · Cybersemiotics · Antenarrative · Answeability · Ethics

15.1 Introduction

What is the relation between storytelling and cybersemiotics? In reading through issues of the journal *Cybernetics & Human Knowing*, there have been very few attempts to answer this question. Among them is Carlos Sluzki's (1995). Approach, to unpack 'communication' in cybersemiotics as the transformative process of 'dominant narratives' sustaining problems and 'new stories' that are liberatory in ways that find new system states through therapeutic conversations. Clients in this kind of storytelling therapy can be persons, families, or organizations. For Sluzki (1995: 42) there is a cybersemiotic aspect to all the in Heinz von Foerster's notion of *eigenvalue*. Foerster (1978) innovates by including the observer in a recursive

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approach to eigenvalues, between its text and its denotation. It is this idea that gives Sluzki (1995: 43) entrée into a cybersemiotic understand of how eigenvalues applies to the "process of transformations of narratives that we call therapy". I need to tweak Sluzki's storytelling approach slightly since he, like many others, uses the terms 'narrative' and 'story' interchangeable.

In storytelling paradigm I work within, narratives accomplish retrospective sensemaking that are 'backward looking' generalizing and abstracting within the world of a particular [dominant] culture, whereas 'living stories' are *in situ*, part of 'indigenous' life world which are 'context looking' at what is unfolding 'here-and-now' situationally (Boje 2001, 2008, 2011, 2014). For me, it is imperative to tease out the differences between western narrative that tend to monologic abstract forms of emplotment, and living stories that are contextualized. Here and there, Sluzki does treat story differently than narrative, but not consistently. For example, Sluzki (1995) says:

> A *story* (I am referring now to a local, isolated story with full awareness that it is as much pragmatic fiction as an isolated family) can be described as a system composed by *characters* (**who** participates in the story, and by implication, the universe of the excluded), *plot* (**what** is taking place), and *scene* (the **when** and the **where** that envelopes characters and plat), all woven together by an *internal logic,* from which emanate *behavioral consequences* (what do we do as a result of that descriptions), *moral/ethical consequences* (in which locus the characters are placed in terms of good-bad, sane-insane, victimizer-victim, etc.) and, of course, *interpersonal consequences* (the relations effects of those guidelines) (p. 43).

Narratives can see from the standpoint of semiotics, for example, as 'forms' or habits from Peirce's semiotics, just to mention one, as representationalism, that can be 'guides for actions'. The tweaks I would make to Sluzki's description, is that a 'living story' is local, but never isolated, and it is the cultural narrative that is oftentimes the pragmatic fiction (or illusion) of isolation. I do agree with Sluzki (1995: 43–44) that [living] stories are in "multiplicity" of [polyphonic] relations resulting in "*reverberations*" within the systems in which they are enacted. A final tweak it is the dominant narrative-pattern (rather than stable story-pattern, in Sluzki), which I believe enacts its *eigenvalue,* dominant monologic of the narrative within dominant culture.

While a complete review of narrative philosophy is beyond the scope of this chapter, I can provide a brief treatment. I follow Mikhail Bakhtin (1973) and Jacques Derrida (1979), in treating narrative as monological, whereas stories are never alone, and in a webwork of [living] stories. For Bakhtin (1973), "narrative genres are always enclosed in a solid and unshakable monological framework" (p. 12). Story, for Bakhtin, is decidedly more dialogical than narrative, for example in the "polyphonic manner of the story" (Bakhtin 1973: 60). For Derrida (1979, p. 99–100) views story "as both larger and smaller than itself"; analogous to what we are calling the web of living stories. Finally, I always treat stories as indigenous, as 'living stories' that have a place, a time, and a mind of their own, an aliveness, and are unfolding in the here-and-now, without an end, or a unitary beginning (Boje 2001, 2008, 2014). The narrative form since before Aristotle (350 BCE) is in the strict form of six narrative elements in a hierarchic order beginning with plot, then characters, theme, dialog, rhythm (or melody), and the least important, the spectacle (costuming & glitz). For Aristotle, narratives are linear pkots with a beginning, middle, and end defining a whole. However, unlike Aristotle's day when plot dominate the narrative ordering, in today's world, particularly in U.S. culture treats spectacle as more important than plot or character development, as most U.S. movies and novels do testify.

Sluzki's use of scene instead of spectacle staging as the when and the where, and plot as the what, and characters as the who – calls to mind, Kenneth Burke's (1978) refinement of Aristotelian narrative by which plot becomes the act, characters the actors, theme the purpose, spectacle the scene, and dialog and rhythm are mushed together as the agency. Burke's Pentad, by definition, is the five elements of narrative: act, actor, scene, agency, and purpose. Instead of hierarchic, Burke's contribution is to make them non-hierarchic, so that various ratios can be constructed as ratios, such as the act-scene, the actor-agency, act-purpose and other ratio-combinations of narrative elements. Weick (1995) is more Aristotelian, where in his notion of retrospective (backward looking) sensemaking narratives, there is emplotment of beginning, middle, and end.

In sum, I treat stories as communal and quite polylogical (many logics) and polyphonic (many-voiced). Living stories are embedded in larger multiplicity of relationships that are dialogical in polyphonic. Narratives and stories are dialogically multi-stylistic (oral, written, dramaturgic, architectural), multi-chronotopic (a mix of various decontextualize adventure narratives, and contextualized folkloric stories). Both narratives and stories are constituted out of architectonic discourses that for Bakhtin interanimate (see Boje 2008 for a complete discussion of how these four dialogisms are entangled). Each dominant narrative has consequences in constraining the nowness of living story by limiting future (antenarrative) alternatives that are possible in the storytelling system. In their social construction of storytelling actors get 'stuck in the past' in problem-saturated (retrospective) narratives that dominate their 'living stories' in the here-and-now, and actors are oftentimes unable to envision or enact 'antenarrative' liberatory futures. The result is their dominant narratives run their life world here-and-now, so that positive future is impossible to imagine. In this chapter I suggest some relationships that storytelling organizations as systems of sociomaterial processes has with cybersemiotic in its bio-social-semiotic praxis.

15.2 Storytelling and Autopoietic Cybersemiotic Communication

Cybersemiotics, in the main, treats storytelling as eight communication examgeg of information, energy, and material constitutive of open systems (McWhinney 2007), and or as part of the semiotics of sign-games in relation to biological cybernetics (Brier 1995, p. 5). As Brier (1995) explains:

> In Peirce's semiotics, signs are triadic dynamical processes called semiosis, where the represtamens get their interpretants from a semiotic web in an ongoing historical evolution which will over time be able to stand for more and more aspects of the dynamical object. From a biological view, then, meaning is in the bio-social praxis which the sign takes part in (p. 6).

The connection I intend to make with cybersemiotics is that storytelling organizations are also fundamentally triadic (an interplay of narrative-counternarrative monologic, contextualized living story polyphony, and antecedent antenarrative processes (before, between, beneath, becoming, and bets on futures of both narrative and living story). Storytelling is not just humancentric sensemaking, but takes in sociomaterial intra-activity of materiality *with* discourse, and includes ways material configurations are agentive, shaping many kinds of human routines (Sele and Grand 2016). Human and non-human actors along with material actants (such material configurations of buildings, software, and tools) are *intra-active* with organizing routines. In addition the human being is a walking ecosystem of biological processes, such that the body, its 32.7 trillion living cells participate in the storytelling. The storytelling of that intra-activity is in actor-actant networks of micro-biological-activity, information processing that is fully embodied and macro-configurations (economy, technology, culture, and so on that are contextual and situated in wider sociomaterial arena, including how human activity affects climate through Carboniferous Capitalism effects).

The relation to Brier's cybersemiotics lies in the three kinds of Luhmann-autopoieses working together in inseparable relation to Peirce semiotics: psychical, socio-communicative, and biophysical. My argument here is that storytelling also has psychical, socio-communicative, and biophysical dimensions. What follows is an exploratory interpretation of cybersemiotics communication in its bio-social-semiotic praxis in relation to the sociomaterial storytelling paradigm (see Boje 2014, 2018b). My suggestion is the Luhmann autopoietic and the Peirce semiotics, as Brier brings them together in cybersemiotics, has some important contributes to the storytelling paradigm. I am not saying there is a one-to-one correspondence, just that investigations need to be done in future research. Next, I will get more definite about the storytelling paradigm, and then follow up with connections I see more directly with cybersemiotics. To do that I have to expound on my view of the function of storytelling in human cognition and communication.

15.3 What Is the Storytelling Paradigm?

Walter Benjamin (1936) said 'storytelling is coming to an end.' Our competency as humankind to convey living experience from one person to another, mouth-to-mouth, is declining rapidly. Once the traveling storytelling, the seaman, the transporter on land, and the at-home storyteller in a blacksmith or print shop, had the competency to convey experience mouth-to-mouth. With the industrial revolution, factories industrialized, the seaman and blacksmith were forbidden to sing or even to tell stories on company time. Gertrude Stein (1935) did four lectures on '*narration*' at University of Chicago drawing large crowds: about poetry narration, news narration, narrative narration, and history narration. I agree with Benjamin and with Stein: The ancient ways telling living experience are being displaced by the new ways of narrative all about information processing, and not much depth of history. What I have been calling 'living stories' embedded in a place, unfolding in time, in material ways (Boje 2001, 2008, 2014) is different from what Karl Weick (1995) calls retrospective narrative sensemaking. And I agree with William James (1907: 98), "Things tell a story" because things are 'vibrant matter' (Bennett 2009/2010a, 2010b). Therefore my short answer is 'storytelling in and around organizations' in sociomaterialism ontology is what Karen Barad (2003, 2007) calls intra-activity of materiality *with* discourse. But there is more to it than that. Let me illustrate with a story of things form my university. When William James (1907) in traduces "Things tell a story" he is writing the sixth specification of a systems theory, about the *unity of purpose*:

> An enormous number of things in the world subserve a common purpose. All the man-made systems, administrative, industrial, military, or what not, exist each for its controlling purpose. Every living being pursues its own peculiar purposes. They co-operate, according to the degree of their development, in collective or trivial purposes, larger ends thus enveloping lesser ones, until an absolutely single, final and climacteric purpose subserved by all things without exception might conceivably be reached... Our different purposes are also at war with each other (p. 96–97).

James (1907) does not claim teleological [narrative] unity, but rather an *aesthetic union* when he states "Things tell a story":

> … *aesthetic union* among things also obtains, and is very analogous to teleological union. **Things tell a story**. Their parts hang together so as to work out a climax. They play into each other's hands expressively. Retrospectively, we can see that altho no definite purpose presided over a chain of events, yet the events fell into a dramatic form, with a start, a middle, and a finish" (p. 98, boldness mine).

I treat 'living stories' as unfolding in the present, and with as James puts it, partial stories interlacing making a living story webwork (Boje 2014). For me, and most narrativists I know, it is narrative that demands an aesthetic unity, a dramatic form of beginning, middle, and end emplotment. Mikhail Bakhtin (1981) says narrative is always monologic, in a narrative aesthetics, which goes back to Aristotle's (350 BCE) narrative wholeness of the six elements; Stories, by contrast, are polyphonic. However, unlike James or Aristotle, Bakhtin addresses differences between monologic *narratives* and polyphonic *stories* in particular sociomaterial directions, such as in stylistic dialogism where not only verbal and written kinds of storytelling occurs, but architectural styles. In chronotopic dialogism, Bakhtin develops more natured ways in which storytelling is a part of generative fertility of the earths biological cycles. Finally, in architectonic dialogism, Bakhtin goes beyond Kantian cognitive systems to include cognitive discourse in the interanimation with ethical and aesthetic discourses.

Of particular interest to cybersemioticians, Bakhtin (1993: 2, the book of his notebooks written between 1919 and 1921) tells us 'Culture'-World and 'Life'-World is not the same and constitutes two-faced Janus, facing in different directions,

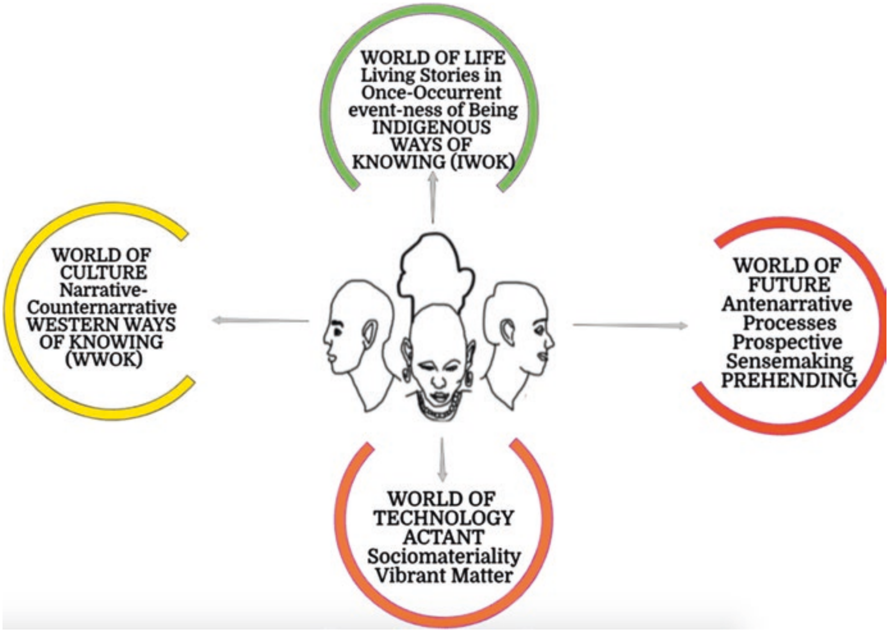

Fig. 15.1 Four faces and worlds of the storytelling paradigm

with no unitary plane between them for communication. Culture-World narratives, from the standpoint of Peirce's semiotics, can be seen as habitual 'guides for actions' that are backward-looking. 'Culture World' looks narratively-backward, at the past, that never was, while Life-World looks to the once-occurrent events of Being, in the context of here and now, unfolding. I think Janus has a fourth face, I call antenarrative, looking to the future in prospective sensemaking (Fig. 15.1).

I will build up this four worlds model, then connect it to Brier's Star Model. Antenarrative is constitutive of the living story here and now looking down at present, and the retrospective sensemaking narrative looking backward at the past (Boje 2014, 2018b). Bakhtin says that the "aesthetic activity as well is powerless to take possession of the moment of Being which is constituted by the transitiveness and open event-ness of Being" (1993: 1). I take this to mean the retrospective narrative in its aesthetic activity of plots and characters is split off from the living story looking down at present, and in its moments of open event-ness of Being. Antenarrative is an ontology process of becoming ante (before, between, beneath, & bets on the future) by looking forward at many possible futures, and enacting one of them in historical act or activity. Narrative by itself is "unable to apprehend the actual event-ness of the once-occurrent event" of living story relations (Bakhtin 1993, p. 1).

To the 'World of Culture' of narrative-past, the Life-World of living story 'here-and-now', I would like to focus attention on a third world, the "world of technology", mentioned only once by Bakhtin in his 1919–1921 notebooks (1993: 7). And add a fourth, the Future-World, of very different antenarrative processes. Bakhtin's two-faced Janus is only the World of Culture (i.e. narrative) and the 'World of Life' (i.e. living story webs of relationality), while the three-faced Janus includes antenarrative processes, the prospective sensemaking, and pragmatist sensemaking of looking and preparing in advance, possible futures. Storytelling, therefore, is the Being of event "*in its entirety*" and as "a *whole* act [that] is alive" with antenarrative processes constitutive of narrative and living story (Bakhtin 1993: 2). The 'World of Culture', its 'special answerability' as judgment validity, and the World of Life, its 'moral answerability' has no community except through antenarrative processes.

Bakhtin's special answerability actor does not intervene, merely looks on as the passive bystander, while moral answerability actor in the once-occurrent event-ness of Being actually does enter into the constitutive moment as active, complicit, responsible, and ethical participant in Life-World. In and around organizations we need more moral answerability (Bakhtin 1990, 1993).

In the Fig. 15.2, I have drawn in the barrier between World of Culture and World of Life. Based on Bakhtin's (1993) work, I consider that in the barrier between World of Culture and World of Life there is no possible communication, fusion, or concresence. Here is the point of integration between storytelling and cybersemiotics: cybersemiotics, in some sense, is trying to overcome this barrier. There is something in the recycling of things, putting those things into the bin-things that points to the relation between aesthetic-narrative, and living-story. Aesthetics rules the decoration of the three Business College buildings, and it's bystander 'special

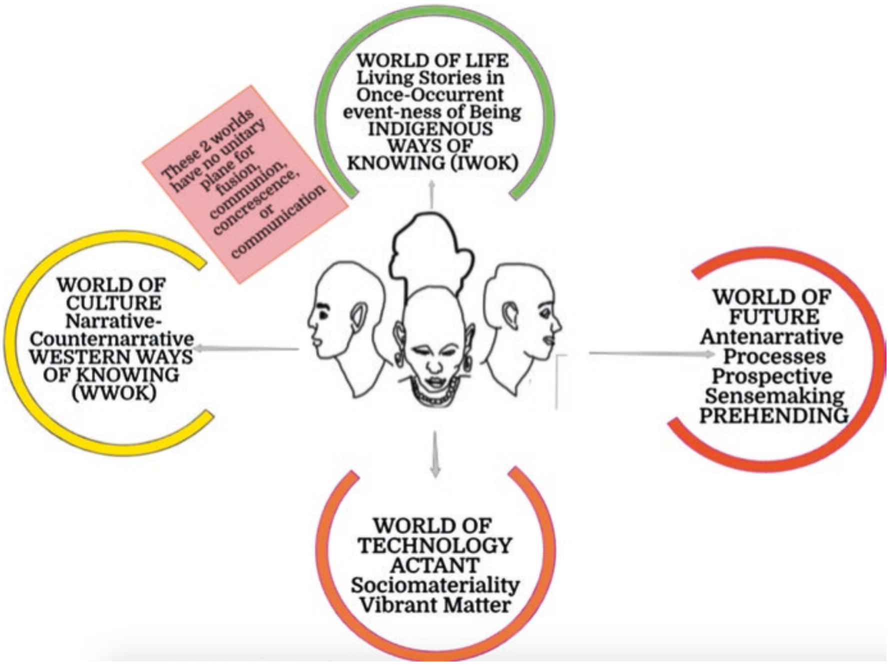

Fig. 15.2 The four-fold faces and worlds of storytelling

answerability', of people looking on while recyclables are contaminated with trashy material things. Please explain more 'Moral answerability', by contrast, runs through the living story 'Life World' in which context matters to living story.

Bakhtin's later work (Bakhtin 1981) stressed the monologic plots narrative, of Culture-World has split from the polyphonic dialogism story Life-World, in all its aliveness, 'living stories', unfolding here and now. I follow Bakhtin (Boje 2008) as well as the differences between western ways of knowing (WWOK) and indigenous ways of knowing (WWOK) to develop an understanding of the constitutive role of antenarrative processes in WWOK-narrative and IWOK-living story relationships (Pepion 2016; Cajete 2016; Rosile 2016, Grayshield 2016; Humphries 2016; Smith 2017a, b). My proposition is that these two domains have different antenarrative processes of possible passageways but do not directly interact. WWOK-narrative and counternarrative are 'dialectical' opposition processes splitting apart, and IWOK-living story webs are 'dialogically' constituted refracting context. Storytelling is also historical and history-making, and as the Business College recycling case testifies, lots of history-forgetting. Why? Because the is forgetting of how recycling operates, fewer personnel left to remember because of the downsizing of staff, and a shift in China's routines (no longer accepting the kinds of recyclable materials it once did) (Fig. 15.3).

Above I propose two antenarrative pathways. One is from 'World of Future', a pathway of antenarratively moving beneath 'World of Technology' to 'World of

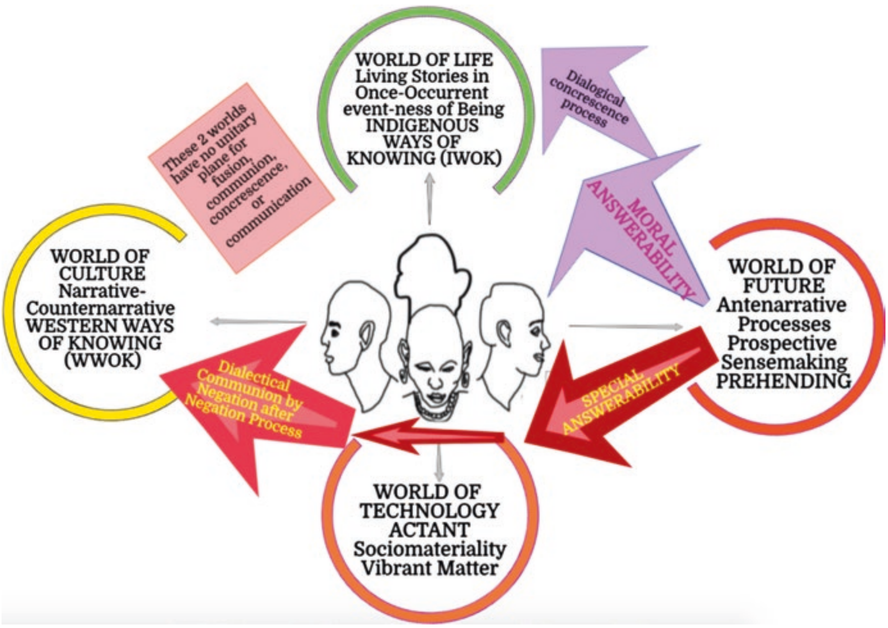

Fig. 15.3 A blockage between 2 worlds and two very different antenarrative processes constitutive of some other worlds (Boje 2018a, b)

Culture' (& narrative aesthetics) in which a 'special answerability' (by-standing) results. It is through the 'World of Technology' and the 'World of Future' that I theorize pathways around the barrier Bakhtin contends is between 'World of Culture' and 'World of Life." One such path is 'moral answerability', from 'World of Future', antenarratively to the 'World of Life' (& living story webs, of relationality, diffracting context). The direction I am going is to build a bridgework between storytelling and cybersemiotics. What I am doing is suggesting some limitations of western ways of knowing (WWOK) in habits of backward looking narrative, and differences with indigenous ways of knowing (IWOK) that I am calling 'living story webs of relationship' to context in two ways: to contexts of indigenous communities, and contexts of situated ecology. IWOK living story webs of relations are contextual and dialogically polylogical, whereas, WWOK 'World of Culture' narratives are decontextual and as Bakhtin (1981) argues, always monological. The focus of IWOK living story work is to become a theory, method and practice (*Kaupapa Māori paradigm*) that stands toe to toe in academia with the western narrative paradigm. A complete review of IWOK living story is beyond scope of the chapter (Please see Rosile 2016; Humphries 2016; Pepion 2016; Bear 2000; Cajete 1999, 2000, 2015; Deloria Jr and Wildcat 2001; Smith 1999, 2003, 2008, 2017a, b; Hoskins and Jones 2017).

Gilles Deleuze (1968/1994) provides us four narrative-illusions that I must introduce to explain why I use 'storytelling paradigm' as inclusive of narrative, and say storytelling in and around organizations, and antenarrative processes. Deleuze's major concept, before all others, is 'multiplicity.' Deleuze differentiates three multiplicities: extensive in spatializing, intensive in temporalizing, and virtual in ways I will relate to 'by-standing' and to those 'aesthetic narratives'. You see, I am an 'ensemble of multiplicities storytelling' professor, and a Deleuzian ontologist recently awakened to four critiques of narrative, for their illusions:

- **First Illusion ➔ Representationalism of Narrative**: Thought is covered over by 'image' made up of postulates, and this, for me, is Deleuzian 'virtual multiplicity' a slippage of 'Actual/Real' into the 'Virtual/Real' of representational narrative. This is also a slippage from Platonic world to the world of representation (p. 265) into illusion. 'World of Life' its intensive multiplicity of unfolding living present is not 'World of Culture' of representation of some illusion of 'pure past' (Deleuze 1968/1994: 81–2). The 'pure past' is an illusion, a virtualizing by narrative aesthetic.
- **Second Illusion ➔ Resemblance of Narrative-Culture to Life-World of Living Story**: the subordination of difference to "qualitative order of resemblance", the 'quantitative' copy and the theory-model are the resemblance, and the illusion of good sense (Deleuze 1968/1994: 1, 266).
- **Third Illusion ➔ Narrative covers over the multiplicity play of antenarrative processes**: "Beneath the platitude of the negative lines the world of 'disparateness'… multiplicity…affirmations of differences" (Deleuze 1968/1994: 266–7). This extensive multiplicity, spatializing of play of differences is for me, by constituting antenarrative processes, beneath bets of the future, before-between-becoming and constituting narrative and story.

- **Fourth Illusion ➔ Narrative as "Subordination of difference to the analogy of judgment**" (p. 269, boldness, mine). Narrative illusion is aesthetic analogy of judgment that Bakhtin (1993, his 1919–1921 notebooks) calls the 'World of Culture; that is a duality with the 'World of life'. The 'World of Life', for me, is the here-and-now once-occurrent Being of event-ness unfolding in living story webs of relationality diffracting context, and those living stories are nomadic, moving, reterritorializing in extensive multiplicity.

My point here is that we can find Bakhtinian challenges to monological aspects of western narrative in Deleuze's work. In particular the representational aspects of western narrative is only one of the sign systems that cybersemiotics is theorizing. I assert we need to pay more attention to various kinds of history of multiplicities that are in and around storytelling organization and organizing, and to all the forgetting of history that is happening to multiplicities, to ones that are Deleuzian (nomadic, expansive, intensifying, virtualizing), and others, Sartrean (totalizing, centering, dialectics). For this project on multiplicities, I would like to turn to an essay Walter Benjamin wrote in 1940 that is part of *Illuminations* collection (Benjamin 1940, 1955, 1968, 2007). My premise in this essay is that storytelling in and around organizations is a contest among multiple dynamic ontologies of multiplicities (Boje 2018b), histories so poorly understood, so quickly forgotten, that it is leading humanity to a sixth extinction because despite all the globalization myths, there is '*no planet B'* (Boje 2018a). My premise is that people on planet A are not paying close enough attention to living beyond, consuming and producing beyond planetary limits. I am arguing for a kind of storytelling in relation to cybersemiotics, that deals with such crises as climate change, the depletion of natural resources in Carboniferous Capitalism, and the level of pollution of oceans that is killing most marine life.

Benjamin (1936, 1955, 1968, 2007) in his amazing essay, *The Storyteller*, declared that 'storytelling' itself is 'coming to an end'. And a year earlier Stein (1935) seems to agree that various ways of narration are displacing the ways of telling by those storytellers who could convey experiences orally. Benjamin (1940) gives us insight into ways of telling history, in this subversion of IWOK living storyability by narration, by WWOK-narrative and its reverence, for textuality. Benjamin, believing the Nazis were invading, left Paris for Port Bau Spain. He was en route to the US to join with critical theorists, Adorno and Horkheimer. He died September 26 or 271,940 in, Spain, either committed suicide when his manuscript was confiscated at the border, or was covertly assassinated by Stalin's murder squad, for not doing dialectical historical materialism properly reference? Be that as it may, Benjamin (1940) just before he died wrote about the interplay of different ways of doing history that can inform our inquiry into the storytelling in and around organizations. These are the types of history I read in Benjamin's work: (1) historical materialism focus on 'material things' telling about the class struggle, differed from (2) historicism focus on the Judgment Day of a redeemer, (3) the chronicler reciting historical events like a rosary bead without distinguishing major and minor ones, with nothing that ever happened completely lost form history, (4) the biologist who looks at human history are but a few seconds on the 24-hour clock of world history, and (5) the soothsayer who inquired into the future. Where did they come from?

For Benjamin historical materialism offered a way to critique what Lyotard (1979/1984) later called the progress narrative in his report on education. "The true picture of the past flits by" in the "historical outlook of historicism" is not "the way it really was" (Benjamin 1940, p. 255). Microstoria that I wrote about as a contrasting method to historicism (Boje 2001) uses archives to recover that past without filtering it through the present obsessions. Historical materialism watches both the historicism of the present and the microstoria rescuing of the past as moments of danger. The historicism historian looks at images of the past, which historical materialism claims become the "tool of the ruling classes" (Benjamin 1940: 255). Microstoria is in danger of resurrecting a 'pure past' which Deleuze (1968/1994) says that never was the 'living present." To this we can add that retrospective narrative sensemaking is a conforming past, that is used as a tool of the ruling elite of most every organization, and the counter-narratives of the workers, and the counter-counternarrative of historical materialism.

I would like now to turn to an organization example of how storytelling is embedded in history that is shot through with diverse discourses. Why?? I will develop the case of the multiplicity of the recycling points on my university campus, and look at its storytelling dynamics, and its cybersemiotics.

Things Tell a Story Upon return from sabbatical travels to eight countries, I noticed in our university, in the Business College, some things had been moved. The big 'blue' recycling bins, on wheels, that had occupied a place on the third floor of the Business Complex building (waiting for some donor to give it an endowment in exchange for naming it), those same bins now reside beneath the stairwell on the first floor. *Things tell a story!* When I walked the stairs (many young students take the elevator), to the third floor, I noticed in the place where the recycling things, that *apparatus*, that *actant* ➔ in its place was some black furniture, some chairs too small to sit in, and an empty book case. I began to do some retrospective sensemaking narration (Weick 1995). I recalled that this was not the first time that big 'blue' recycling bins on wheels, were moved under the stairwell. It is a definite fire hazard. You just do not stack recycling cardboard and paper in a fire well (Fig. 15.4).

There used to be, in 1996 when I first arrived at the university, four blue bins on wheels, neatly inside a wooden casement, where faculty, staff, and students separated cardboard, color paper, and white paper, and newspaper. In 1996 I motivated a Delta Sigma Pi business fraternity pledge class to put stickers on the light switch that said 'switch em off when not in use' and we made posters over the blue recycle bins on the 3rd floor, so people knew what things to threw into what bin. We also distributed an inexpensive white and colored paper sorting system to each faculty office. About 30% of faculty refused the system, saying that they did not believe recycling made a difference. A decade ago the paper-sorting recycle system was replaced with a single blue plastic container about one foot high. It did not come with instructions so many of us continued to just put both white and color paper in it, and let the recycling center on campus sort it. The absences of the bins, those things missing, tells a story (Fig. 15.5).

Fig. 15.4 Things tell a story – under the stair well at Business College

Fig. 15.5 The absence of things tells a story

About 12 years ago, a new Business College dean, had the wooden casement tossed, and the large blue recycling bins on wheels moved under the stairwell. During the tenure of this new dean (3.5 years in office) the four large blue bins on wheels, on the 3rd floor, were moved to the 1st floor, into the stairwell, resulting in a total of seven under the stairwell. In their place on the 3rd floor, was the apparently more aesthetically pleasing bookshelf combination desk with stools. The dean, however, when asked yesterday (Sept 5th) did not know why the recycling bins had been removed from the 3rd floor to behind the stairwell, on the 1st floor. And when students in my small business consulting class, asked faculty and staff, they also did not know the history or the reasons for this move. It is, most would agree, another blow to recycling. Someone had decided aesthetics was more important than a properly maintained and spatially located recycling system. I recalled getting an email a month ago, about each of six colleges having some windfall money, left from the downsizing of the staff body and the faculty body, to divide amongst them. I speculated, perhaps the new furniture was ‘spoils’ of the downsizing. It’s not enough data to make an empiric retrospective narrative, because the Business College personnel, faculty, administrators, and students have forgotten recycling system, and were bystanders, looking on at the chaotic remnants of a system that once was embraced (Fig. 15.6).

I speculated, perhaps the new furniture was ‘spoils’ of the downsizing. It’s not enough data to make an empiric retrospective narrative. At a more macro-level, there had been a change in the purpose of the university, and new administrators, and their consultants were reshaping its systems to be more economically efficient, and recycling was being marginalized, under budgeted, and aesthetic bookcases and stools, could attract more tuition-paying students. I was chair of the sustainability council of the university, twice, and worked hard to bring about greater consciousness of how recycling matters. When I taught the leadership course last Wednesday, I noticed another partial story. For the 22nd year, the Guthrie Building, classroom wing on the first floor did not have any recycling system at all. I had requested, but been told, again and again, there was no money for such things. I rebelled. I went to the administrative wing of Guthrie building, which once housed the advising center (it was centralized across campus, and moved to other side of campus). I picked up an underused plastic bottle, cans, recycling system, and brought the thing into the other wing of the building, into the class of somewhat surprised leadership students. “Look, this is where you put your plastic bottles and your cans. They do not belong

Fig. 15.6 Under the stairwell, hidden from the classrooms, is a recycling station for plastic bottles and aluminum cans, telling its story

in the trash can." Go in any classroom of the three buildings of the Business College, and you will find paper, plastic bottles, and aluminum cans thrown into the trash bin. In Spain, Germany, Denmark, Finland, and many other nations, you would be fined for contaminating recycling with the trash. But in New Mexico, there are no fines, and the norms of social conduct are that of the bystander: 'let someone else worry about it'. After class I put the plastic and aluminum can recycle system, back in the administrators' wing of the building. I am contemplating antenarrative action, by preparing in advance for a rejuvenation of the recycling locations, adding more bins, and some instructions on what to recycle, but it is my last semester before I retire, so why do I bother? When I taught the leadership course last Wednesday, I noticed another partial story. For the 22nd year, the Guthrie Building, classroom wing on the first floor did not have any recycling system at all (Fig. 15.7).

Domenici building used to have two bins in this stairwell and two in another stairwell (4 in total) and now only the one remains. I had requested, but been told, again and again, there was no money for such things. I rebelled. I went to the administrative wing, which once housed the advising center (it was centralized across campus, and moved to other side of campus). I picked up an underused plastic bottle, cans, recycling system, and brought the thing into the other wing of the building, into the class of somewhat surprised leadership students. "Look, this is where you put your plastic bottles and your cans". In the third Business College building, 'Dominici Hall' there are bins missing, bins never purchased, and this too tells a story (Fig. 15.8).

There used to be one recycling bin underneath the stairwell (under the word Atrium in the photo) and now none. What do these material stories (Strand 2012) tells us. Its what Bennett calls an (2009/2010a) 'onto-story' an assemblage of things, in relationship that in is 'vibrant matter' that is the 'force of things' (2004), telling what I call 'living story'. It is also what Barad (2007) terms agential-realism, the intra-activity of materiality *with* discourses of sustainability, university budgeting,

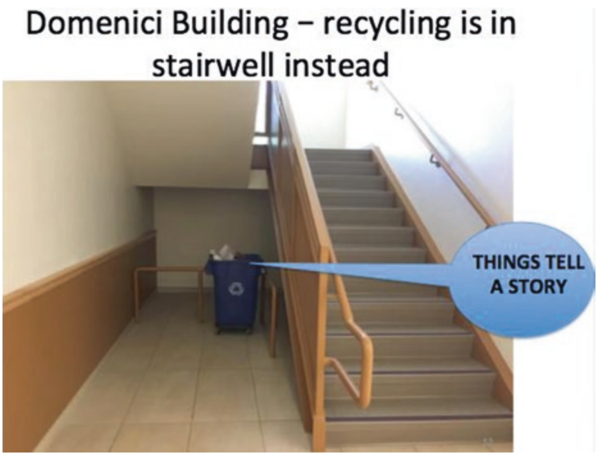

Fig. 15.7 In another Business College Building (Domenici), a lonely recycling bin, tells its story

Fig. 15.8 Domenici building what is missing in recycling system, tells a story

and the aesthetics of a university that keeps its recycling containers out-of-view. It is a 'university in decline', a university that cannot sustain its 'extensive multiplicity' of spatially distributed system of recycling stations and bins, or reconfigure their placements as new buildings (i.e. Domenici, is about 6 years old) have materialized. There is forgetting of the past, of the way the recycling system had run years ago, earning many accolades and awards. In 2008, my university, NMSU receives the Post-Secondary School Recycling Program of the Year Award from the 'New Mexico Recycling Coalition (NMRC)'.[1] "The goal of the NMRC is to have waste valued as a resource, and their award recognizes those who work to promote recycling and composting throughout New Mexico" (IBID.). What is interesting is there is no history kept on the site after 2008.

University Systems in Decline Public universities are being run like businesses, and this is happening around the world. Business consultants are being recruited to make it happen. For example, September 2015, the then Chancellor commissioned Deloitte consultancy, at a cost of $622,700, to spend five (some say ten) days with our university's Board of Regents. The consultants came up with a dandy PowerPoint based on cutting and pasting some university budget data, and advised the Regents to set up six task groups to do actual implementation: To downsize both staff and faculty bodies, to reorganize broader spans of control, collapse administrative and academic units, trim some vice president's assistants to assistants, and to implement business process reengineering to save countless millions. At a recent department meeting I attended on August17 2018, I learned that our university, it Board of Regents, did all that collapsing, downsizing, and increasing its spans of control, consolidating resulting in 19 administrative units, and saving $12.1 million. I sus-

[1] NMUS history of recycling accessed Sep 5 2018 at http://nmrecycle.org/

pect this is where the aesthetically-challenged furniture was financed, and displaced the big blue recycling bins on 3rd floor of the Business Complex building. No malice, no conspiracy, it's a matter of forgetting why a recycle bin system was in place, forgetting the history of sustainability systems, in order to, attract students with a more visually pleasing aesthetic.

The administrative order now spends about $1 million a year to advertise locally on billboards, placing ads in movie theatres claiming our university has 'no limits, no boundaries', and there is to be a shopping mall, a new golf course, and a hotel to encourage enrollment. Other millions were divided among six deans to do whatever they wanted to their colleges. A few short years ago, my department had 17 faculty members and a solid doctoral program. When I leave the end of December, six faculty members and a department head assigned by the dean, from some other department, will remain. My own answerability ethics has switched from 'moral answerability' to the retiring bystander with only 'special answerability'. Our university is not alone. Taking a moral answerability stand meant leading votes of no confidence, holding a wake for the doctoral program, writing articles, giving speeches, and actually marching in protest (Boje 2017; Boje et al. 2017; Boje and Cai-Hillon 2017a, b).

Our university is not alone in making the transition from being a public university for the public good to being run as a business with profit centers, including the new golf course, shopping mall, hotel complex, under construction. For example, at McKinsey went to Minnesota State Colleges and Universities system (MnSCU). Chancellor Steven Rosenstone hasn't revealed what McKinsey & Co. consultancy produced for its $2 million contract:

> MnSCU also released materials McKinsey produced to help the system launch an overhaul earlier this year. MnSCU officials say the company worked hard and provided guidance, not prescriptions, for a campus-driven process. But faculty and others say they remain troubled. The work took place away from public scrutiny, which, they say, makes it harder to size up its value. It didn't help that MnSCU recently provided a McKinsey proposal for the project that was almost entirely redacted… McKinsey also helped pen a "change story": an open letter to faculty, staff and students urging them to be bold in tackling changes and promising transparency. It created an engagement plan and provided training to administrators"

McKinsey did similar consultation at Columbia University and University of North Carolina with similar result of increasing academic capitalism by using business consulting firms to implement austerity programs (IBID.):

> … Columbia University faculty members criticized an unpublicized $1.1 million McKinsey report that had recommended some graduate tuition increases. At the University of North Carolina System, a $2.6 million McKinsey report on eliminating academic program duplication was not discussed by the governing board or a strategic planning committee, according to media reports.

What these consultancy projects with universities (Deloitte at Kansas State University and NMSU, McKinsey at Minnesota State Colleges, Columbia University, and University of North Carolina) reveal is a disturbing trend in higher education that includes lack of transparency, circumvention of faculty governance, a quick fix approach to downsizing and business process reengineering. And each new chancellor/President/Provost has to have their own consulting firm do it all again. My point is that much harm results from the storytelling in and around universities that legitimates these quick fix, cut-and-paste, PowerPoint and Xcel spread sheet consultancy reports used to legitimize downsizing and reorganization strategies Boards of Regents were going to do anyway. Most every new chancellor hires a consulting firm to do it all over again, tossing out years of implementation of the last chancellor. So it was no surprise when yet another new chancellor announced he would bring in his own consultancy firm, and also expand the upper administration, and run the university like a business. As the new chancellor at our university, Dan Arvizu, puts it this way:

> Essentially, we're running it like a business," Arvizu said. "This is what you would do if you were in the private sector and running an organization through a set of outcomes. It's challenging to do in academia, I get that … but we're moving in that direction" (Chancellor Arvizu plans to manage NMSU 'like a business' Algernon D'Ammassa, Las Cruces Sun-NewsPublished 3:14 p.m. MT July 28, 2018).

This movement of private sector 'Totalization' is called 'academic capitalism' (or 'neoliberalism' Ideas) establishes a dialectical Reason, a monologic narrative expression in the universities around the world to be run like a business. And it is happening around the world, to universities, for example, in Denmark, downsizing the humanities faculty so as to preserve and expand the science, engineering, and business faculties (Bülow and Boje 2015). This is what we see all over the Western world and the point of this new narrative has been made by so many not at least in critical newspapers The narrative framework of this '*university* = *business*' totalization is "the negation of the negations [that] becomes an affirmation" of a counternarrative dialectic, the socioeconomic 'Idea' that the university is a 'risky' business subverting the public good into a private good, and one quite wasteful, in which placement of recycling bins recedes to lower and lower priority, and to quite faint remembrance (Boje 2017; Boje et al. 2017; Boje and Cai-Hillon 2017a, b).

15.4 Discussion of Storytelling and Cybernetics of Recycling

Consumption and production are human routines, consuming and producing 'things' (Sele and Grand 2016). Recycling technology includes the equipment, bins, and other tools to make consumable things get sorted so it does not all end up in the landfill. Antenarrative means 'preparing in advance' for the future, choosing a 'bet on the future' and antenarratively preparing which future to attend, to observe, and to actualize. 'Prehension' is an antenarrative concept that means grasping some 'thing', taking control of things, to manage the future. The 'World of Culture' produces a 'World of Technology' that generates the capacity for wasteful consumption in the 'World of Life', which, in turn kills the 'World of Life', faster than we can RECYCLE, REDUSE, REUSE. We are therefore on a slippery slope, a downward spiral. Besides killing wildlife, plastic and other debris damage boat and submarine equipment, litter beaches, discourage swimming and harm commercial and local fisheries. The problem of plastic and other accumulated trash affects beaches and oceans all over the world, including at both poles. Landmasses that end up in the path of the rotating gyres receive particularly large amounts of trash. Here is how I see storytelling participating in Brier's 'Cybernetic' Star model (see Boje 2018b), to which I positioned 'World of Life' and 'World of Culture'. Here I pick up the storytelling-cybersemiotic trail, once more (Fig. 15.9).

To put it simply, the storytelling worlds, I developed earlier, are connective between various points of Brier's Cybernetic Star Model. Living story (World Of Life) makes sociomaterial connections between Life/Living Systems and Matter/Energy points of the Star Model. Narrative monologics (World of Culture) make connections between the Inner Life/Consciousness and Sense/Meaning points of the Star Model.). The next figure adds two more storytelling-cybersemiotic connections worth exploring (Fig. 15.10).

Above, I add the ways Actants (World of Technology) link Matter/Energy and Sense/Mean Star points. Finally I add how Antenarrative processes (World of Future) connect between Life/Living Systems and Inner Life/Consciousness Star Model points. In sum, my integrative approach enters the phenomenological 'World of Life' constituted by living story webs and communication is unpacked as hermeneutics of how pre-narrative (antenarrative processes) and pre-story (antenarrative processes) are in hermeneutic relationship. I We believe that you cybersemiotics is a kind of fourth order grounded theory returning it to realism from its original constructivist tendencies (Boje 2018b).

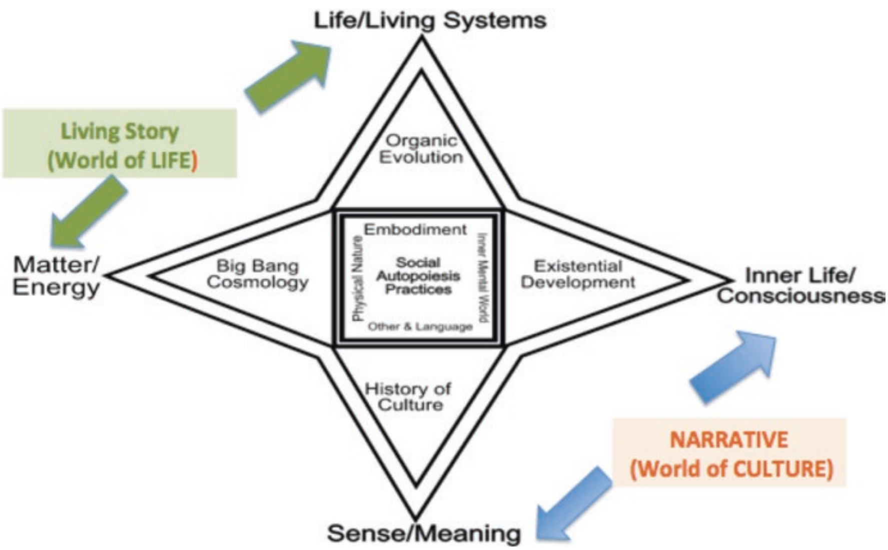

Fig. 15.9 How storytelling (2 of the worlds) relates to Brier's Cybersemiotic Star model

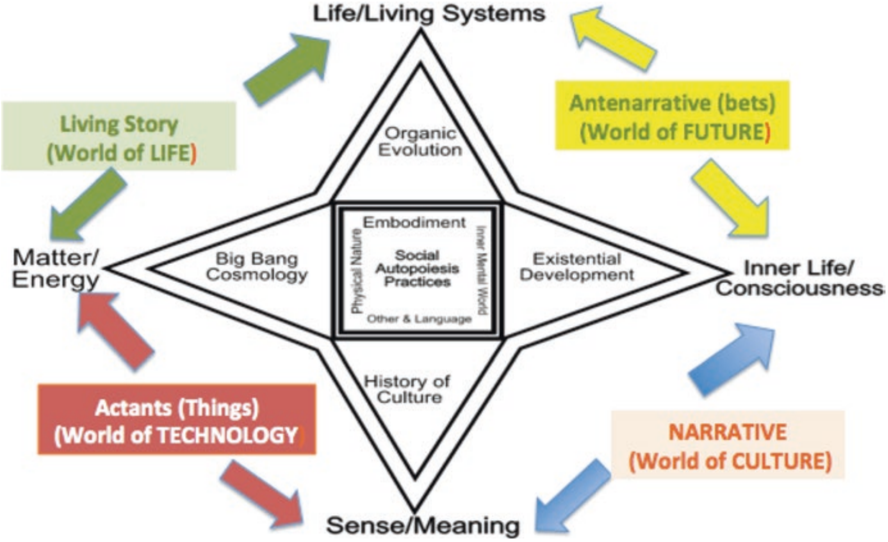

Fig. 15.10 How storytelling paradigm and cybersemiotics are entangled

15.5 Discussion and Conclusion

This storytelling paradigm, I have introduced, has implications for cybersemiotics. ‘Brier’s (1995) ‘cybersemiotics’ integrates Charles Sanders Peirce’s semiotics (both numeric- and qualitative-multiplicity of open series of some 24 triads) with the autopoiesis of Niklas Luhmann’s cybernetic ‘closed’ systems theory of three autopoieses. Cybersemiotics, by my reading, can benefit from integration of IWOK-living story knowledge and WWOK ‘Narrative of the Other-intersubjective with BEING’ in the Natural World of BIOLOGY/MATTER/ENERGY, the ‘World of Life’. The sign, in cybersemiotics, is anything that communicates meaning. The thing, tells a story about some-thing happening, moving, reassembling vibrant things. Bruno Latour’s ANT theory, already has a semiotic philosophical foundation: ‘Interpretant’ refers to a sign that serves as the representation of some actant-thing (Fig. 15.11).

Narratives, living stories, and antenarratives processes make what Barad (2003, 2007) calls agential cuts in the multiplicities (extensive, intensive, virtual), by making a boundary, of what is in and what is out. The sociomaterial is entanglements of things *with* discourses (ecological, economic, ethical, aesthetic, cognitive, and so on). In the ‘storytelling paradigm’ dominant narratives, living stories, and antenarrative processes are what Barad terms ‘material-discursive *intra-actions*’. My contribution, in this chapter, is that we can acknowledge the systems contribution of William James (1907: 98) ‘things tell a story.’

Walter Benjamin (1936) said, “Storytelling is coming to an end” because the skill to tell a living story and to listen and understand living story is less than it was.

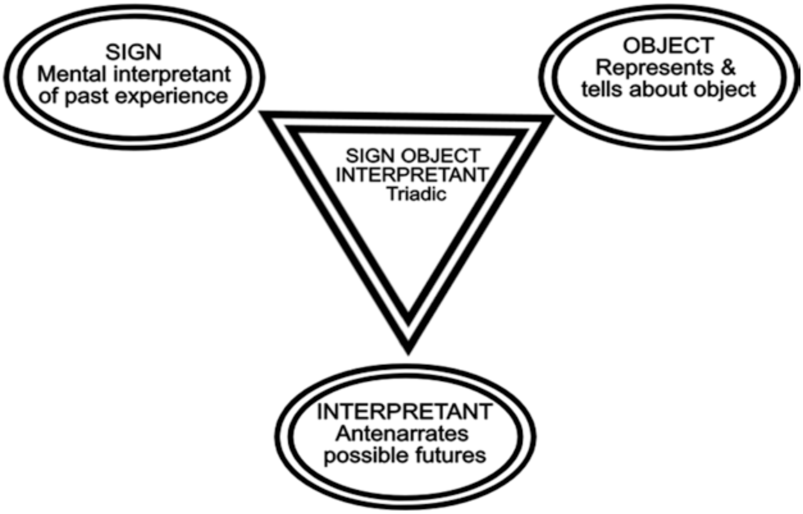

Fig. 15.11 Triadic of sign-object-interpretant in Peircean semiotics it is not sign but representamen, and the whole triadic process is the sign

Why? For a long time, workers no longer allowed to sing together or tell 'living stories' while they work. Because of the rise of 'Western Narrative 'that is disconnected from context, ungrounded to Mother Earth, to IWOK storytelling of relation of 'World of Life' to ethical answerability giving way to 'World of Culture' to how World of Technology' will save us from ourselves. The 'World of Technology' has turned digital, and is merging with the virtual multiplicity, in ways that is radically changing the 'World of Culture' and making 'World of Life' increasingly unsustainable. The 'World of Future' is foreboding.

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Chapter 16
Communication and Evolution

Vivian Romeu

Abstract This text proposes a conceptual model to understand and study the communicative phenomenon. It does this by understanding communication as a phenomenon of life, so that it can be conceptualized as an expressive behavior that results in an expressive act within the framework of the theory of evolution, which makes the expression as a unit viable of primary observation of communication. Although it is based on a concept of communication slightly different from that assumed in the cybersemiotic program, we consider that the biophenomenological proposal of the communication presented here can serve as an articulation for the development of at least three of the arms proposed by Brier in his Star Cybersemiotics, so that it contributes to the development of this ambitious and necessary transdisciplinary program.

Keywords Communication · Evolution · Behavior · Expression · Experience · Meaning · Cybersemiotics

16.1 Introduction

The cybersemiotic program is an emerging program, still in development, that seeks to offer a comprehensive and transdisciplinary response to the necessary problem of scientific knowledge, and in particular to the body-mind dualism that is registered today, both by the natural sciences and on the part of the social and human sciences. For this, it has focused it's attention on semiotics as the episteme of knowledge, but not on the anthropomorphic semiotics that has dominated the academic and scientific scene so far. The cybersemiotic is installed in a different and novel paradigm that assumes the postulates of the biosemiotics that in turn, explains the evolution of life from the processes of semiosis. However, this biosemiotic paradigm has been

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questioned by cybersemiotics as an epistemological proposal, since they point out that biosemiotics lacks the necessary historical basis to account for how living organisms -specifically human beings- evolve through semiotic processes that they deploy, especially in regards to drawing an evolutionary line between unconsciousness and conscious phenomena.

To alleviate this problem, they resort to peircian semiotics and specifically to the concepts of sign, information and code that it provides, concepts under which not only a logic of relationship and understanding, but also a phenomenology. The cybersemiotic program, moreover, is closely related to Luhmmanian thought, specifically with its concept of communication as the structuring of life, which in turn is based on the theory of autopoiesis. But from our point of view it is about irreconcilable traditions that, in their meeting, affect the clarity of the cybersemiotic postulates. We will explain why.

For Peirce, knowledge evolves from less to more, that is, hierarchically, in search of patterns or regularities or habits, in the manner of a rule or a disposition to know, insofar as it puts the subject in a cognitive relationship with the object through a series of mediations that he called signs. In this way, for Peirce the regularities could only be configured logically but not from a binary conception, but from a ternary logic, where the sign was the form communicated by the object to an interpretant (Peirce 1955). This makes the Peirian logical system a phenomenological system for the explanation of the emergence of knowledge; only that it is a formal, mathematical model, where all cognitive interactions must be described ternary, that is, in terms of the relationship between sign, object and interpretant, which in turn presupposes the relationship of the mind with the qualias (Firstness), the relationship of the mind with reality (Secondness) and the relationship of the mind with the world of perceived regularities (Thirdness).

These three categories form the basis of Peircian logic, from an epistemological imprint that denies the existence of an ontological world, of an objective reality. Therefore, when Søren Brier (2017)[1] emphasizes that the cybersemiotic program seeks to explain the five ontological levels of meaning, an essential contradiction emerges. In our view, what cybersemiologists seek to define are rather explanatory levels of reality, that is, paradigms of knowledge that in no case allow to classify or divide it more than for its analysis, since to assume the existence of an objective reality regardless of the cognitive processes by which it is constructed, it does not go hand in hand with the Peircean approach, but rather with one of Luhmmanian, structuralist and ahistorical stock, which downplays the agent's explanatory importance, that is, the fact that experience and know.

[1] The five ontological levels are: the level of physical existence, from where they assume the existence of animate life and the principle of causality, based on the principle of Peircean synechism, that is, the continuity between matter and consciousness. The second level is called the level of the efficient cause, specifically linked to what they call Peirce following the will power of the mind. The third level is that of objective information, meaning the ontological world. The fifth level is that of self-organized life and the fifth is that of human self-consciousness.

Leaving aside an explanation about the cognitive agenciality of the living being, and even about the role that living beings have in evolution -as it is affirmed from the evolutionary biology that is the paradigm in which cybersemiosis is sustained via the biosemiotics (Brier 2008)- results in the questioning of the explanatory bases of biosemiotics being unclear in the cybersemiotic bet, so that the tacit appeal to an objective understanding of reality where the processes of cognition are imbricated, significance, information and communication that try to understand in the explanatory domains -that not of reality- where they are carried out, mine their purpose of objecting a mechanistic view of science, from the evolutionary point of view.

But because Peirce puts on the table, above all, a phenomenology of interpretation, that is, an explanation of the way in which the perceptive and intellective experience makes the semiosis emerge progressively, that is, through degrees each once more sophisticated interpretation, its semiotics in any case should be informed and contrasted with the most recent developments in the field of phenomenology in conjunction with those paid for the philosophy of the mind and especially for the neurobiology, specifically for the case of the human beings.

This would allow us to rethink the pertinence of making Peircian theory the basis for the construction of a transdisciplinary concept of communication in the terms in which cybersemiotics conceive it, as it equates interpretation as a semiotic act with communication, this can not be understood rather than as a mechanism of "passage", that is, as the way something emerges from the mind, since from the Peircean logic, this (referring to interpretation, not communication) is constituted from the regularity, the habit, the given. Although Peirce himself referred to the sign as the communicated form of the object, this does not allow communication to be conceptualized as the rule of action or the disposition to know that configures his concept of interpretation. In any case, the communication would be in Peirce a kind of representation by means of which the sign emerges to the mind, that is, it develops; what happens through a phenomenological approach that puts in the center of the reflection the experience and the subject that experience that is, according to the same Peirce, from where the processes of cognition are explained where the semiosis occurs, that is, where the representational configuration of the sign.

Nevertheless, the Peircean legacy in this regard is today largely developed by the advance of scientific knowledge by phenomenology, cognitive sciences and neurosciences, from which it is postulated that living organisms do not live in differents domains of reality, that the conscious and the unconscious do not separate even in the same organism, and that the distinction of the occurrence of these processes among living organisms could pose a categorical difference around the binomial consciousness-unconsciousness, the continuity to the who appeal should be treated rather as a difference of degree.

The New Cognitive Science offers a clear answer to the above. From the incorporation of the concepts of agency, adaptability, autonomy, identity and precariousness as crucial explanatory inputs in the understanding of cognition phenomena, the designers make the life experience of the organisms the basic core of the processes of construction of meaning, which they call without further: cognition. These processes are defined based on what they call the search for meaning (Varela 1991, 1997; Weber and Varela 2002; Di Paolo 2005, 2009; Di Paolo et al. 2010; Thompson 2007), present in all living beings, thus correct the theory of autopoiesis of Maturana and Varela (2009) to explain how internal cognitive adjustments occur through the processes of cognition for the sake of adaptation and survival of the living unit. In this way, the New Cognitive Science allows us to explain the emergence of creativity, not from a cognitive connectionist or representationalist view of knowledge, but from the autonomous, precarious, adaptable condition and agency of living organisms as beings with creative response from the organic-material organization that allows it and as far as this allows without affecting the structural identity of organisms, both in terms of environmental changes and in terms of internal changes in it.

On the other hand, neurobiology has brought to light a series of explanations, experimentally verified, that allow to sustain the own developments of the New Cognitive Science from an explanation about the functioning of the human brain. From both perspectives, the theory of autopoiesis, where the cybersemiotic proposal also rests, due to its Luhmmanian roots, must be revised by the New Cognitive Science in order to integrate cognitive experience in it from understanding living beings as agents. This necessarily undermines the idea of communication as an autopoietic system, substituting the closed system principle, operationally closed, by one that makes it differentiated according to the agency capacity of living organisms, which also implies its ability to adjust its own patterns cognitive that has configured and evolved.

Although from Luhmmanian logic communication is made an abstract principle to describe the functioning of life that fits Brier's cybersemiotic reading of Peirce, communication has been converted into interpretation from the imprint of the autopoietic structural coupling; nevertheless, both as a whole cancel an explanation of communication linked to the creative life experience of individuals who are, in our view, those who know, interpret and communicate. To deny the above supposes break with the biosemiotic postulates and in general with those of the evolutionary biology, to which it is not possible to accede without giving crucial importance, determinant, to the capacity of agency and adaptation of the living individuals[2] that is what, that according to Jonas (2017), allows to refer to the emergence of new meanings, new ways of life and also new forms of semiosis.

The thesis that we develop in this text walks in this direction, starting from a reflection of the postulates of evolutionary biology and its application in the construction of a communicative analytical perspective of a new type that goes on to understand communication as a behavior, specifically as an expressive behavior. Under the cover of biosemiotics, phenomenology, New Cognitive Science and

[2] From this perspective it is assumed that the biological-experiential substrate of living individuals provides the basis for thinking about the emergence of culture and even of society. An incipient approach to these questions can be found in the texts of the author *The problem of understanding in language and communication. Reflections from a biophenomenological approach to communication in human beings* (Romeu 2017), *The problem of culture in the social sciences* (Romeu 2019a) and *Sociability and sensitivity in Simmel. Reflections from the phenomenology of communication* (Romeu 2019b), these latter in the press.

neurobiology, we offer an explanation of the processes of cognition, the emergence of meaning and the construction of information that are valid for proposing a transdisciplinary conception of communication, but from these epistemic courses. Finally, before moving on to develop the hypothesis that we hold here, it is necessary to delve into more detail in what we have said previously, with the purpose of establishing our position within the cybersemiotic paradigm, as well as the possible contribution that this work can make do to it.

16.2 Coincidences and Disagreements with the Program of Cybersemiotics

As we have already pointed out, the research program in Cybersemiotics, founded and directed by Søren Brier, of the University of Copenhagen, proposes the construction of a naturalist paradigm of information processing in the universe. This paradigm is supported by two major theoretical sources: the phenomenological and pragmatic semiotics of Charles Peirce, and the systems theory of Niklas Luhmann. Brier's proposal and the researchers in charge of it, is based on the absence of an integral theory of information that can account, from an evolutionary point of view, for the processing of information in the universe, from a first-class perspective (subjectivity), second (intersubjectivity) and third person (science). This is: that it encompasses both the individual that experience – which is always a corporeal individual – and its intersubjective nature, and also science. It is about building a transdisciplinary paradigm that can explain the emergence of the processes of meaning in the natural world: from the Cosmos to Culture. In the end, as can be seen, there is a theory of information, knowledge, consciousness, meaning and communication, from where it is intended to account for how the cognitive and experiential production of meaningful knowledge of human beings emerges evolutionarily.

This theory is positioned against the physicalist paradigm of information. In this way, he understands information as something that is in reality, but that is present to human consciousness through experiential perception. Thus, from understanding the relationship between mind and matter as natural and continuous, cybersemiotics strives to build a natural theory of information processing that overlaps the latitudes of consciousness, meaning and communication. From these premises of departure, the Cybersemiotic develops an explanatory model from which it tries to understand how the displacement of an information society occurs (in the informational terms that we have briefly described above) to a society of knowledge, where according to Brier they are involved the processes of meaning, communication and language. Brier's proposal brings together both the natural and social sciences and the humanities, articulating them through a first-person perspective via human consciousness, since for this author an embodied consciousness is absolutely necessary to develop an ontology of information from the conscious mind in the living body.

It seems idle to point out the relevance of this ambitious scientific commitment. But we nevertheless add to the criticism of Hofkirchner and Larsen (2009) regarding the difficulty not only of defining information separately from meaning, but also of the relevance of this separation. In this sense, to our understanding, cybersemiotics is entangled in the information theory of Shannon and Weber, as well as that of Schödringer, based on the fact that meaning is not a necessary condition to define information as it is defined as patterns or codes that have nothing to do with meaning, with which they assume that meaning emerges essentially from the relationship between form and background (Brier 2010). This point of view about the meaning not only does not correspond to Peirce's notion of Firstness, but has been overcome by the New Cognitive Science and its paradigm of the "search for meaning" that Varela (1997) himself accepted, questioning some form, the same concept of autopoiesis that helped to found (Weber and Varela 2002).

Peircean radicalism, although it differentiates between the real and the existent, refers to the real as that to which we can only access through signs that are formed or configured from the experience of perception. And it is from this experience of perception, at least in human beings (although it is presumed since the New Cognitive Science this is also applicable to all living organisms), that the real acquires existence for us: first through feelings or intuitions we have about the world, then through associating these feelings or intuitions with the real, and finally establishing habits of relationship between what is felt and what is perceived as real through units of meaning that are in themselves patterns of meaning, that is, codes.

This not only verifies that codes or patterns not only contain information, but also meaning, as it is structured by them, as already Ascombre and Ducrot (1983) pointed out and demonstrated from argumentative linguistics. In that sense, if we well understand Brier, we think, he ran his conception of information in a kind of naive objectivism, the result of the positivist tradition of physics (even the quantum) that despite the scientific evidence that supports it has not been able to radicalize his view to understand philosophically the implications of assuming information as a dependent magnitude of observers and the observation processes themselves.

Brier (2004) argues, in agreement with Bateson (1972) and others, that information is difference; hence, it appeals to the fact that information is potential knowledge. This distinction between information and knowledge also appeals to the distinction between the "objective" and the subjective, between that which depends on our conscience and what does not. In that sense, information is in the things of the world, but it is used when it is known; this point of view needs of what Brier calls an embodied consciousness. Based on this distinction, the beings that naturally inhabit the world, according to Brier, do not produce knowledge, they only process information; while human beings and some animals, by having consciousness, we do.

The scientific contributions coming from the neurosciences and the New Cognitive Science, especially from the latter, deny, or at least question the above, by pointing out in broad strokes that the imperative of life to continue living, that is, to preserve the identity autonomy of living organisms makes them come in a certain way neurally and genetically programmed to "understand" what they have to do to survive and manage life in the environments or environments in which they are inserted. Certainly, in the environments that the human being faces, this “knowledge” is not enough, due to the complexity of them and the free will of sentient beings and willingness as we are to act, even within the organic limits or natural Therefore, as we will see later, understanding information as something alien to meaning does not make much sense from this perspective.

Regarding the above, also, from the Peircean theory that is profoundly phenomenological and pragmatic, this is endorsed. As Deely (1990) points out, in Peirce there is a pansemiotic conception that disable the difference between the sign and the real, not due to a negation of the real, much less due to an equivalence between both. Rather, we think what Peirce points out is that reality, even existing, becomes an instance for the construction of information through signs.

Peircian semiotics puts the accent on the experiential perspective of the first person, but Brier (2003), in our opinion, makes an incorrect interpretation of it arguing that if this difference between the sign and the real were not present, there would be no difference between the representation and the object, or the idea of truth should be discarded. Right, in this last premise, our argument is paraphrased. The existence of the real is not given, in our opinion, by the presence of information, but by the perception itself – through consciousness – that there is something outside of us, what we call Reality, but that is inaccessible without making use of it through the signs that, in addition, we build mentally, thus constructing reality itself, and even, as it is proposed from the neurosciences and the New Cognitive Science, constructing ourselves as part of it through our vital interactions.

Thus, the conceptual proposal of communication that is developed in this text bears the imprint of “bottom-up” that according to Brier (2013) sustain the theoretical physicalist approaches on the information-knowledge relationship, but without assuming in any case the information as a magnitude alien to the subject that processes it. Although reality, as conceived from Luhmann and Peirce, is a precondition for the production of knowledge, the truth is that this reality does not become present or does not emerge (no longer to consciousness, but to perception itself) if it is not within the framework of an interpretative relationship of different degrees of the living individual throughout the length and breadth of his own individual and species existence.

Consequently, when Luhmann points out that only communication can communicate, which is one of the systemic postulates on which Cybersemiotics is based, it not only detaches the communication of life, but inserts it into a tautological structure of meaning that our way of seeing does not support the construction of a comprehensive theory about information, meaning, cognition and communication. Luhmann postulates that communication only takes place to the extent that there is mutual understanding, understanding communication as a synergistic phenomenon that occurs through language and social praxis, that is, in situations of intersubjectivity.

As we will see later, this text proposes another starting point to deal with both the concept of information and the language, which brings as a consequence the emergence of a different way of understanding communication that, however, can contribute to developing the Cybersemiotic Star with respect to the relationship of articulation between living systems, conscious life and the world of meaning. Thus, the proposal on communication that in this text is made seeks to situate the communicative phenomenon in the articulation between the level of formal causes and that of the final ones, establishing a bridge between one and the other from articulating the cognitive processes that take place within the living organism with those of external cognition, from where, through rationality, logical thinking and the inferences derived from it, social language and culture appear, to our knowledge. Although the latter will not be developed in this text, but only mentioned, in other works we have tried to account for it. However, we consider that this omission -because the objectives we pursue in this issue- does not diminish the importance of the possible contribution that, from the field of communication and through this biophenomeological proposal of communication, is tested here.

16.3 Raising the Study Problem

The epistemological conditions that guide communication studies today (specifically those that understand it from a sociocultural o funtionalistic perspective and centered on the media) have made it difficult to consider communication from an evolutionary standpoint. Nevertheless, this point of view is needed, because communication is a phenomena of live and therefore is necessary focusing on a comprehensive outlook that, put succinctly, could lead, besides, to an epistemological model for discussing the theoretical and conceptual fragmentation that characterizes the field. We believe that the key lies in the evolutionist stance, based on the biological theses of modern Darwinism, because it offers a possible explanation of communication, in general, as a fact of life, and those that communicate are living beings. Understood in this way, communication could be considered as something that takes place within the universe of the natural and/or social–cultural ecosystems of living things, specifically as an expressive type of behavior.

This approach is broad enough to include the considerable research and academic thought in communications studies up to today; however, because these studies are generally fragmented into specialized cultural-symbolic areas (political, educational, organizational, intercultural, development-based, media, interpersonal communication, and others), we must understand what has been done and considered so far as only a part of what communication can and should study, because as an expressive behavior, communication has a lot to say in many different social and cultural realities and about many of life’s phenomena. Most important, it takes on different forms and content depending on the agent who does the communicating, that transcends the human sphere. Therefore, we believe it is more effective to explain what it is that we seek to understand from a communications standpoint when we do research on communication. As unfortunate as it may seem, this has not been answered clearly, and we believe it begs an answer. There is a need to give an epistemic meaning to the fragmentation, so that it involves a concrete space rather than the differing, often contradicting world visions that have been seen in our academic field since it emerged and became institutionalized.

Even today, there is no clear concept of communication that allows us to discuss the plurality of existing *approaches*, and not just of traditions from which communication has been studied. Scholarly work on communication has become specialized, or sometimes even hyper-specialized, with no strong epistemic base from which to describe this specialization for what it is: restricted, limited, or even profound areas of study covering a specific topic, but not connected to other areas. For instance, the communication epistemological approaches inside the communication studies is nor taken to account by applied researches. It has undoubtedly diminished the heuristic potential of communication as an academic field, especially, but not exclusively, if we consider that our field has turned the branch into the trunk, most notably by making mass media the core of most research and discussion on communication. Even though, fortunately, this situation has changed over the last two decades, the change has been minimal, and the same explanation for specialization is still generally given, with no comprehensive nodal epistemic trunk, which represents a bigger problem because the academic communication field continues without having a clear study object.

In this epigraph, we attempt to overcome this omission by recurring precisely to an explanation of communication as a phenomenon, which will allow us to include the discussion about its conceptualization in considering communication as an expressive behavior and act. Because communication is a phenomenon (an act that takes place within each organism's life experience) we can value it as part of a vital act from which sense or meaning is displayed and used, necessary for the maintenance of live. To make our hypothesis clear, we divide the epigraph into three sections. The first section is centered on the main hypotheses of modern evolutionary biology, with special emphasis on three relevant aspects of this Darwin-based line of thought: the agency, efficiency, and reach of natural selection, the main theoretical backbone of evolutionary theory. We hope to prompt a reflection on the role of perceptive experience in the development processes of organic life, based on ideas within the phenomenology of perception and supported analytically by enactivism, biosemiotics, and neurobiology, which will be our focus in section two, highlighting the logical link to the evolutionary theses.

In the third section, we develop a proposal of communication as an expressive behavior and act, basing our analysis on the theories presented in the first two sections. This third part allows us to outline how these behaviors work and how they shape expressive acts in different living organisms. This is a short epigraph with huge aspirations; the task of pairing communication and evolution reaches far beyond these pages. Still, our goal is to offer general conceptual guidelines for the creation of a comprehensive epistemological approach for considering an object of study in communication, something not specified thus far. An analysis of society through dissimilar types of communication has mistakenly been established as an object of academic communication studies at both the national and international levels. This object has been the focus of most, if not all, scientific production in our field. As we know, it is an object that has been taken over—mainly by sociology—and that has not been able to explain sufficiently how communication works, even in the sociocultural environments where it has been studied and perfected. For this reason, we feel that this epigraph offers an important analysis.

16.4 The Main Basis Behind Evolutionary Biology

Evolutionary biology is a branch of biology that explains how life works in nature from a Darwinian, evolutionary perspective. Natural selection takes on the main role as a mechanism of the origin of life, and selection is the main point of focus of evolutionary changes. It is not the only factor that influences evolution, but in Darwinian terms, it is the most-decisive, because natural selection explains the organism's fight for survival, which makes competition for life the main factor in understanding its bases, creative and adaptive evolutionary changes (Gould 2010). One of the most-important aspects of Darwinian natural selection is adaptation, understood as the driving force behind the variation and diversity of organisms and species. Adaptation was determined as the cause for natural selection (p. 150) because of how it worked in response to the ongoing changes in the surroundings or environments where the organisms went through their life cycles. It made adaptation to the main scenario in which selection took place a slow, constant transformation where the fittest took the place of the least fit, increasing their possibilities for survival and for the survival of their descendants that inherited the favored evolutionary traits that had come out of the adaptation.

As it can be seen, the idea of adaptation as the driving force behind survival implies a functional conception of the maximization progress of life. Darwin's viewpoint is accepted completely today: species evolve and become fitter to survive in environments whose conditions change more-or-less constantly, leading to new, stronger, fitter species than the predecessors, and organisms that do not adapt die out. Although this idea of evolutionary progress would appear to be linear, Darwin instead explained the randomness of selection, which he based mainly on two factors: environmental variability (slow or fast changes to conditions), and the vital needs of the organisms he observed, in which the ability to adapt takes place. It is known as biological functionalism, which favors a conclusive explanation of how nature works, and especially of the origin of life. Darwin's biological functionalism strengthened his evolutionary theory with the formula "form follows function." It means that each morphological trait of an organism had a specific function, which developed precisely based on adaptation and survival in the environment's changing conditions, and, taking into consideration—as Darwin did—the slow evolutionary geological time flow, meant that an organism's morphology was the result of adaptive mutations that affected directly the creation of different species over thousands and thousands of generations. The outside influence of the environment's transformation on organisms and species was noted in the main explanation of evolutionary theory[3] and was later tweaked by other theories, which added that an internal structural driving force in the cellular and genetic chemistry also influenced evolution.

Darwin's theory grew little by little, especially with the development of genetics—which was completely unknown when *On the Origin of Species* was written—and underwent many not essential changes over more than two centuries. Gould (2010) claims that, despite these transformations and addendums, the theory of natural selection is still the clearest, most-solid explanation for evolutionary biology so far. Gould (2010, p. 37), a renowned evolutionary paleontologist, notes three aspects of Darwinism that he believes are the cornerstones of all evolutionary thought today: the agency, efficiency, and reach of natural selection. He believes that, based on Darwin, agency has to do with organisms' ability to act based on their fight for survival and the fight of their descendants; efficiency means the ability of organisms to adapt; and reach is the extrapolation of these changes in the descendants, to create new forms of life (Gould 2010, p. 83).

From this perspective, a communication act precise agency and ability, and then it can be extrapolated to others because communication act is expression of living beings that can be conceptualized as a practice, even, socially, as a praxis. Through this expression, living beings project their existence by means of saying, in such a way that the saying, the expression, is a way of taking out the meanings that they construct throughout the length and breadth of their existence in their inevitable relation with the environment. These meanings are the primary material of communication and implicit in them is the way in which they live, feel or think the life experience that this relationship with the environment provides them, either consciously or unconsciously. This last will depend on the organism in question, because as we aim at a communication concept that transcends the human and conceives all living beings as communicating beings, be the communicative act conscious or not, even intentional or not, just because as we will see later, it depends basically on the living being that communicates, in addition to the very circumstances of the act of expression it self.

Applied to communication, the three central aspects of evolution that Gould rescues from Darwin's evolution theory, can be derived conceptually as follows: agency is organisms' possibility to act communicatively in order to adapt and survive in their environment, with communicative agency understood as an expressive practice, a way of being in the world through which the organisms express themselves. According to evolutionary theory, this ability to act communicatively to survive must be understood broadly, as related to all expressive acts used in at least one process of adapting to the environment. The best example is when babies and toddlers learn social language so they can insert themselves in the social and cultural world where they will develop much of their life cycles. If they do not learn this language, they cannot express themselves, which diminishes their insertion into that

[3] From evolutionary-theory point of view, it is translated to the Darwinian motto: The environment suggests, natural selection makes it happen. However, it is argued that when the environment changes more quickly than organisms can adapt to it, organisms also make it happen through their capacity for agency. For more information, see Gould, in the bibliography of this epigraph.

world. Regarding efficiency, the ability for expressive adaptation can take place in how able we are to “say” something. It has to do first with each individual’s organic capacities, because that is where they get their ability to act expressively, considering also their abilities and competencies to do so. An example would be a human baby whose brain is not yet mature, which means he has difficulties in expressing himself verbally, so his verbal skills are stifled, as are his competencies. Also, given the cultural conditions in today’s globalized world, knowing a foreign language is a favorable adaptive factor, because not speaking English, for example, might put someone at a disadvantage.

Reach can be understood in communication as using a “way of speaking” that leads to new forms of communication, which then leads to other forms and sparks the creative attribute of selection. That is, the practice of communication is able to create new forms and contents of communication. An example would be what humans call politically-correct language, concerning gender, race, the elderly, or the disabled. Feminists seek linguistic equality by using the two genders without privileging the masculine one, as Spanish-speakers continue to do; or people use the term “of African descent” when talking about black people. Another example is the use of “elderly” for those over 60 (when they used to be called simply “old people”), and “physically challenged” to talk about people who used to be called handicapped, or, before that, lame or crippled.

In this sense, although explaining communication from the evolutionary perspective might seem determinist in biological terms, it certainly is not so. The insertion of human beings into the world is determined by rules and conditionings that go beyond biological aspects, because they cannot escape the sociocultural environment. Therefore, even though we base our premise on the biological functionalism of evolutionism (as Darwin based his theory on Adam Smith’s economic theory), transferring it to communication should not be understood as deterministic.

It is worth clarifying that we do not understand communication only as a sociocultural phenomenon. Rather we understand communication as a phenomenon of life, specifically as a phenomenon of the experience of living beings by the mere fact of existing, in the manner of a being-being in the world. This, as we have already pointed out, transcends the human sphere, where communication is also given, from the social point of view, within the sociocultural and symbolic frameworks of this human environment. In this sense, we refer to the communicative phenomenon exerted and experienced by all living beings, each one in the different environments in which their life cycle occurs. Human beings, unlike other living organisms that also communicate, are biopsychosocial beings with symbolic, articulate language inserted in the culture, a unique situation that implies at least three surroundings or environments: the natural or physical world, the social world, and the cultural-symbolic world. Therefore, agency, efficiency, and reach must be explained from these worlds, and none must be superior to the others, unless the context of the expressive act requires it. Organisms whose life cycle develops in only one natural environment, or in only one social environment, would have to act in similar ways.

This, as can you see, places semiotic cognition and communication as a basic sort of reality. But in difference with Brier, this communication proposal is an hypothesis which can explain how communication takes place in different living organisms. This is relevant to describe the relationship that communicative acts have with the communicating subject and their own corporeality, as well as the way in which from that corporality -invested as much of sensations, emotions and affections as of rationality- is the instance of experience First person Regarding the intersubjectivity of communication in social life, as we shall see later, this can also be explained from these bases taking into account that the presence of intersubjectivity in communicative situations of social order is also forged from these corporalities.

This emphasis on different environments organisms face in their life cycle is what allows us to avoid the biological determination behind the theory of evolution. For this reason, and because we are not interested mainly in explaining the origin of expressive acts in each species but rather their functionality and workings with respect to the environment in which they act, instead of choosing the term "natural selection," we prefer "adaptation," as a bridge between empirical and conceptual ways of understanding communication from an evolutionary perspective. We shall focus on organisms' ability for agency in acting expressively, which will help us understand how they work (which is mainly what we will cover in this epigraph), sidestepping from the beginning the efficiency and reach of expressive acts. Doing so should bring about a bio-historic analysis of the species that allows us to see this aspect for the moment. It requires a cross-disciplinary approach that we must provide between biological and communication sciences, as proposed from Cybersemiotics. Before accounting for how the expressive acts of different living organisms work from an agency perspective, we must summarize some conceptual premises we will use to get the needed indicators. We shall use references from phenomenology of perception, neurobiology, biosemiotics, and enactivism. Below, we list briefly the main hypotheses and how they become basic premises to make up conceptually and epistemically the link between communication and evolution.

16.5 Epistemic-conceptual Framework for Studying Communication from the Biological-evolutionary Perspective

This section covers the main postulates of the epistemological sources we believe can be used to consider communication from the evolutionary perspective, besides Cybersemiotics. Some of these epistemological sources are also part of the Cibsersemiótica proposal, and in general we agree on this. However, as we pointed out at the beginning of this text, we do not agree with the idea of information that is handled in this proposal, since we understand it necessarily linked to experience and meaning. This conceptual notion about information is related to the postulates of the New Cognitive Science, which although part of the paradigm of the autopoiesis of

Maturana and Varela, by putting cognitive activity in the center of attention, refers to the agency of individuals as a central element of cognition. This agency is given through the mechanism of the "sense-making", as a vital impulse for survival. In that sense, although organisms are understood as an auopoetically closed system, the New Cognitive Science opens the empirically proven possibility of understanding cognition as a practice of the existence of any living being.

As a literature review, first we attempt to show that communication is a phenomenon, part of organisms' perceptive experience, caused by the creation of meaning in any experience. When we refer to organism's ability for agency in acting expressively, we speak rather from it, because it is these meanings that serve as the raw material for communication. Which ones? Next, we support our argumentation on the bases of enactivism (or New Cognitive Science) and neurobiology to offer a phenomenological explanation of communication, to explain how experiences are made up of acts or processes of construction of meanings, which are also acts or processes of knowledge building. Here, for us, is the mayor difference we have with Cybersemiotic, because we understand knowledge processes equivalent to meaning-making processes. Finally, based on biosemiotics and its main postulate about the vital link between living systems and semiotic systems, we offer a proposal for communication as a behavior. Let us begin.

In the words of Merleau-Ponty (1985, 2008), phenomenology of perception states that every experience is a situated perceptive experience, meaning that it is hooked to the body, embodied. In this sense, perception is an experience because it is felt, lived. Thus, the experience has a meaning, but it is a subjective, individualized meaning. Under these circumstances, communication understood as a phenomenon emerges from the experience of being (Romeu 2016, p. 19), from where meaning is construed. That is why we claim that an experience signifies cognitive activity (p. 20). All living organisms have cognitive activity (Di Paolo 2015), so it follows that all living organisms build information or knowledge based on the perceptive experience they display in their vital interaction with their surroundings. The information that each living organism builds depends on this interaction, which is also inescapable because it is a requirement for existence. We can make an important conclusion that comes from enactism[4]: information is not given (Varela 2005) but rather is built, which leads us to believe that information varies not only from experience to experience but also from individual to individual and species to species.

[4] Enactism or enactivism is part of the so-called New Cognitive Science. It suggests different levels of cognitive activity for all living organisms. Enactism emerged in the 1970s, but gained strength over the next two decades, and defends the ideal that knowledge is not the conceptual product of judgement-like representational connections or associations but rather of conscious or unconscious neuronal connections turned on in an organism's mind thanks to its link to the body. In opposition to the ideas from old cognitive theories, enactists note that knowledge does not come from processing information but from building it. They say that cognition is an ongoing activity that happens through self-organized processes of active participation in the world, and through the experience and self-affection of the animated body. See Varela and Di Paolo's work cited in the references.

In the information-building process, the act of attention to/selection of stimuli is only the first step, and individuals add to the experience by giving meaning to each stimulus that comes about. Understood in this way, perception transforms the fact/stimulus into information when we interpret it subjectively based on our own experience that unfolds in the interaction with it, leading to what we call a phenomenon. Heidegger notes that a phenomenon is something that is shown or that we let be seen when we have an encounter (cited in de Lara, 2009, p. 381). It is how something appears to us through experience. However, we must understand that this emergence does not classify or discriminate objects, because it does not note the quality of something but rather gives a situated interpretation of our relationship with whatever has caught our attention. Up to that point, as you can see, it coincides with the Peircean approach, only where Peirce sees signs, we see stimuli, importance, relevance.

As does Heidegger, we can state that phenomena have a way of being there in front of and because of the being or individual who experiences them, so that the individual's life, and eventually the individual's feeling and thinking are affected, and a meaningful relationship that is essentially representational is born, although subjective.

Enactivist theories (name with which the New Cognitive Science is also known) about knowledge suggest that reality is what we build based on regular cognitive patterns that we incorporate into our neuronal network, so that what is non-cognoscible is formulated not intellectually, but sensorially and even chemically, at a metabolic level, as well as neuro-physiologically. The perceptive acts derived from these levels make up a knowledge structure that is nothing more than a meaning structure with strong neural foundations. These theses are proven through research in neurobiology that sustains that the mind is a functional relationship between the individual and his or her environment (Damasio 2016) that makes possible a knowledge structure going from very basic (based on sensations) to very complex, associated with rational thought,[5] which in the case of human beings, is linked to the construction of subjectivity. Furthermore, Varela's (2005, p. 102) theoretical revelation about the structure of knowledge that emerges from cognitive activity suggests a codetermination between what an individual may know and what he or she really does know, which means that cognitive activity is not only formed from the experience of being but is intersected by it, and therefore represents mostly the building of meanings that emerge from a conceivable, subjective activity. When enactivists define thinking and perceiving as categories of living (Di Paolo 2015), it becomes clear that living organisms participate in the world by building information about it (and sometimes from it, regarding information about themselves, as with humans and some upper mammals) that helps them survive. Consequently,

[5] We should clarify that Damasio, a renowned neurobiologist and the pioneer in this research, creates his theses based on the human brain, but as the enactivists interpret them specifically, it is possible to extrapolate his claims to all organisms with a brain, although the enactivist theory does not distinguish phenomonologically between organisms without brains and all organisms.

cognitive activity is crucial to adaptation and survival, two key functions in evolutionary biology.

This idea was developed in a branch of theoretical biology known as biosemiotics (Santilli 2004),[6] which states basically that the evolution of life is linked closely to semiotic or interpretative processes that act as part of the natural biological mechanisms of selection and adaptation. It suggests that living organisms must interpret the environment and act accordingly; if the interpretations are successful, the acts will be successful and, through inheritance, will be developed by descendants, forging optimal adaptive and survival processes. If they are not successful, as the Darwinian theory suggests, they will die, with no possibility for future survival. In that sence, as Hoffmeyer (1997) point out, biosemiotics is based on the recognition that life is fundamentally grounded in semiotic processes, following Sebeok's idea that life and semiosis are coextensive).

A semiotics-based evolutionary explanation is offered where not only the environment follows this process, as Darwin thought, but also the organisms, as Gould suggests with his hierarchy theory of evolution. These suggestions are backed by Sebeok's (2001) idea of semiosis as a mechanism that life uses in nature and in culture, so this author—perhaps inadvertently—places interpretation at the center of the debate (semiosis). We do not go so far, but it is obvious that here we close the phenomenological circle that we described earlier, where knowledge is made up of living organisms acting in their environment based on their vital experience in or with it. Understood in this way, semiosis, information, and experience are two sides of the same coin: one cannot be without the others. Based on biosemiotic theories, as we can see, this idea is key to every act and process of adaptation and survival, which allows us to infer the role of organisms' behavior.

Piaget (1986) notes that behavior is the combination of actions for using or transforming the environment and for conserving or increasing the faculties that organisms have over it, although behaviors are not only the result of evolution but also determine it Therefore, the origin of behaviors is not in exogenous factors, or at least not exclusively, but is also in processes of experience where there are other organic factors linked to the organisms in question. It leads us to believe that behavior can be explained both by the biological component and by other components, including psychological and mental (Tamayo 2009, p. 289), obeying both casual structural factors and dispositional factors (p. 290). Notwithstanding this theory, the definition of behavior we use is from Galarsi et al. (2011), who indicates that behaviors are actions led by feeling; that is why experience is so important to explaining how it works. Galarsi et al. note that they are activities that all living beings use to

[6] Biosemiotics is based on the pioneer work by Jakob von Uexküll and later, by Thomas Sebeok, and all organisms, but it was Jesper Hoffmeyer who named this line of thought where it is understood that natural selection is activated by the ability to adapt to the environment due to living organisms that interpret it correctly or adequately, which brings about a series of beneficial effects for the organisms, allowing them to "understand" the immense variety of signs in the environment and to "choose" those most-favorable to their vital development. For more information, see the work by Santilli, Sebeok, and Hoffmeyer, in the references.

maintain and develop their lives as related to their environment, responding to it and [when it is the case][7] modifying it (Galarsi et al. 2011, p. 99). In this sense, communication understood as behavior must not only be differentiated from others, but must also have a structure that explains its functioning. Here are some keys to this.

16.6 Communication as an Act and Expressive Behavior

What differentiates communication behavior from other types of behavior is the expressive action it entails. This action takes place through "saying," understood as any action that points out, shows, notes, or indicates something. However, this "saying" should not be reduced to simple words, because we "say" through other expressions: spaces, colors, silences, sounds, distances, objects, practices, feelings, movements, and more. This wide spectrum of "saying" makes up a range of possibilities to express something, or the means and content by which an individual "says" something, where communication related to some king of intentionality. According with the Ferrater Mora Dictionary (1964) expression is a subjective form that "saying" that is defining it as a subjective form that takes on content (p. 626) as the result of an experience (p. 647). All individuals have experiences resulting from situations they have lived, and based on these life situations, they give their world meaning—and in the case of thinking organisms (self-aware or not)—give *themselves* meaning; all individuals can express (themselves), even if the expression is different from others in reach, efficacy, and degree of complexity.

Thus, we note that any individual's expression develops from three central aspects or dimensions: its expressive capacities, abilities, and competencies, which are also related to its perceptive-cognitive capacities, abilities, and competencies, because the content that is expressed is nothing more than the result of the expressive use of the information that was previously built during its process of life experiences. We can conclude that communication in all living beings understood as an expressive behavior must guarantee an explanation of the central aspects that we have mentioned. Behavior is not the same thing as action. Expressive behavior describes the act of expressing (oneself), which in our terms is nothing more than an individual's acting through "saying," whereas an action is the concrete result of said behavior, or the specific acting out of the behavior based only on its form and content. Herein lies the key to analyze an expressive action; to analyze behavior, besides knowing who is carrying it out, why, and to what end, we must also find out what led to and is causing it.

We must note that all behavior is understood as the response to a stimulus, so this stimulus must be understood as what triggers a behavior or makes it possible. Still, a stimulus must not be understood as something outside of the individual, as

[7] We have added the emphasis, because the quote is part of a section that refers only to human beings, which have a somewhat-good ability to modify their surroundings through their behavior.

traditional behaviorists posit, but rather as that which questions the individual from its own rational, chemical and/or sensorial structure. A stimulus seen in this way means a moment of questioning for the individual and can come either from the outside or from within. By "outside," we mean the surroundings, whether physical-natural, social, or cultural-symbolic, depending on the type of organism, and by "within," we mean the organism's own mental structure that "informs" it of its organic state and, when possible, of its subjective state. This because we understand the mental structure as a relation between living beings and the enviroment. Thus, allow us say that the mental structure is present in all living beings with conscious or not, implied in the "sense-making" that enactivism mentioned (see Di Paolo 2015). Cognition for enactivism –and for us- is "a continuous activity shaped by self-organized processes of active participation in the world and by the experience and self-affection of the animated body. The living body creates a world of meanings in its being and its action (in English this is the meaning of the verb to enact) and does not passively receive neutral information from an environment to which it then has to "add" a meaning" (Di Paolo 2015, p. 2). Both stimuli can be perceived both consciously and unconsciously, so behaviors take on these same attributes depending on how they are perceived. Furthermore, behaviors tend to be classified as voluntary or involuntary, individual or social, habitual or unusual, intentional or not (Galarsi et al. 2011).

Based on this reflection, a generic definition of communication as an expressive behavior prompts necessarily an action that may be conscious or not, intentional or unintentional, habitual or creative, individual or social, voluntary or involuntary. Of course, it will depend on the response to the stimulus, but also on the capacities, abilities, and competencies of the organisms in action. For this reason, because any behavior (even expressive behavior) implies an action that is a response to a stimulus, it is important to analyze the stimulus. As we have noted, a stimulus is a moment of interpretation for the organism, that is, is a sign. This means that the stimulus cannot be disconnected from the attention/selection process in all cognitive activity. Organisms have only two options: they accept the stimulus or they ignore it; some animals also have ability for discernment. The interest in or motivation from each organism regarding the stimulus plays an essential role. The interests may be somehow avoidable, such as when a dog does not respond to its owner's call, or they may be unavoidable, such as what happens with most primitive or inferior organisms whose life process depends on the stimulus, for example plants searching for sunlight and water.

As it can be seen, it does not depend on the stimulus but rather on the organism that is forced to face it. In both cases, the perception of a stimulus refers to organisms' cognitive activity, such that if it is very rudimentary—for example, what takes place at a metabolic level in bacteria when they are next to a sugar molecule—the behavior will be stifled by its limited possibilities for action. Bacteria can only respond to the sugar molecule by approaching. The behavior is very primitive, and the expressive action is very limited, because bacteria can only "say" something like this in one way: "It matters, it is essential to me, so I get closer." If there is slightly more-sophisticated cognitive activity, such as occurs generally in mammals, mainly in superior mammals, the range of communicative behaviors might be wider, because unlike bacteria and plants, these animals have a central nervous system that allows them to feel, so their cognitive activity does not take place merely metabolically but also sensorially, which allows them to express (themselves) in more diverse ways, widening their possibilities to “say” something. For example, when a bird is nervous, it shows it by scratching its feathers, whereas a pig whines shrilly. In both cases, a stimulus has been perceived and the organism has responded to it based on its own cognitive and expressive capacities, abilities, and competencies. An ant or a bee does not have much ability to escape from a predator, but apes do, which means that the actions of each are also affected directly by the way they perceive the stimulus. Ants simply do not perceive the predator from a dangerous stimulating perspective, whereas apes “know” that they have to run away to the treetops if they perceive the presence of a tiger and have even developed a social language for warning, which they can use to express things not only to themselves but also to the rest of their herd.

Human beings are an emblematic and apparently unique case. First, it is the only species—at least as far as we know—that uses the three processes of cognitive activity: metabolic, sensorial, and intellectual, the latter particularly efficiently, because humans are able to think about themselves, a talent fostered not only by their use of articulate verbal language but also, very importantly, by the vast development of the prefrontal cortex, and their huge ability for memory and for what is known as extended or external memory, called culture. It helps with and fosters long-term learning and even the ability to make plans.[8] Without a doubt, these human abilities play an important role not only in choosing stimuli but also in responding to them, including expressive responses. We humans have a huge range of expressive possibilities, because our cognitive activity is very broad and allows us to use expressively different types of information, not only for our own organic or biological benefit but also for the benefit of our relationship with others in social networks that we take on and submit ourselves to all the time, overlapped with cultural scenarios where values, customs, moral and social norms, and so on, are set.

Understood in this way, because communicative behavior is necessarily different among different species and individuals, expressive actions are also different in function of each being’s expressive possibilities and resources. From this perspective, the wide range of communicative behaviors responds to the wide range of responses that an individual activates when facing any given stimulus, based on the

[8] Ayala (1980) say that a human being’s biological makeup determines the presence of three conditions of his behavior: the ability to anticipate the consequences of his own actions, the ability to make value judgments, and the ability to choose between different possible actions. Meanwhile, Mora (2005) notes that human beings can have several perspectives of the same problem, we are able to understand another’s point of view, we have a huge ability to empathize, we take part in and transform consciously the world around us, and we go beyond our own biology from within our mind. Furthermore, Wilson (1978) argues that the predisposition to religiosity and the strong ethical basis underlying it makes up an irradicable part of human nature. For more information, see the work by these three authors.

way in which he or she receives it and the expressive type and content used and/or chosen to face it, by way of significance.

But as we can deduce, what happens between the organism and the stimulus through the expressive behavior is the establishment of a relationship. We have called this relationship one of sociality,[9] which is relevant for the organism that expresses (itself), and not necessarily for another organism, strictly speaking, as current communications theories posit. It is not a relativist argument, nor much less a solipsist one. The phenomenological position we use conceives communication as an expressive behavior that can happen both at an individual and a collective level, meaning that it can be explained both subjectively and intersubjectively. We have already covered the subjective point of view; the intersubjective one takes place through communicative interaction, which we do not conceive as something exact, as connectionist, dialogical, or understanding-based positions about communication do, but rather as the result of a dual subjective implication that configures the intersubjective nature of our social communication. In other words, communicative or expressive interaction takes place when an individual is involved expressively with another in such a way that the other's expression acts as a stimulus.

Communicative interactions are converging sequences of the expressive actions and behaviors of different individuals that are used in response to the stimuli each perceives from the other's expressive actions. In this sense, we reiterate that communicative action is not valuable because of the understanding or common perception of information but because of the sociality relationship of involvement that occurs between expressive individuals. It is what allows us to define communicative interaction as an act of expressive convergence, where there may or may not be understanding. With this definition, we take a step forward to oppose the idea that communication necessarily indicates or points out something to another—which is the thesis developed by Martín-Serrano (2007) in his paleontological theory of communication—to focus on a clearer, more-objective theory: we indicate something *to* or *for* the other—which is nothing more than what has stimulated the individual—, based on the significant relevance that we give the stimulus in terms of our interests or motivations in the relationship of sociality.

This relationship of sociality that is established between the organism and its environment makes us think that the environment (whether the other, the self, nature, social, culture or symbolic world) always appears as a threshold of alterity that makes possible potentially the unfolding of the expression, since the expression thus seen is constituted in the way in which the individual acts expressively for the purpose of survival and adaptation to what has motivated him significantly and

[9] We have adapted the concept of sociality from Georg Simmel's (2002, 2014) concept of sociability, where this German sociologist recognizes the existence of social relations carried out through what he calls types of socialization. These types of socialization oscillate between those that are ruled by power and those that are not. Because Simmel uses the term sociability to refer to the latter, to avoid confusion, we propose using Simmel's concept as a basis to refer to sociality as a much-more generic term, since it covers all types of social relations that are set up between individuals through forms of socialization.

significantly. Herein lies the vital character of expressive involvement. If one does not get involved with the other-environment through what one is, it does not survive in terms of "saying," and if it does not survive, it is because it has not handled adequately its expression for/to the other. Expressing oneself is nothing more than a way of living one's own existence. For this reason, communication must be seen as an expressive response of the individual itself in its vital experience that takes place—depending on the individual's capacities, abilities, and competencies—through the expressive use of information that one builds as part of its processes of adaptation and survival in dealing with life. If the individual is able to express itself of its own will, as is the case with human beings and mammals in general, the expression is also intentional and makes possible the production of expressive acts of intervention that lead inherently to the emergence of involvement behaviors. On the other hand, with individuals that are not able to express (themselves) through their own will, the expressive act becomes unintentional and leads to significant behaviors that are simple performative acts. In neither case do expressive acts lose or cancel their nature of involvement, because, as with any behavior, it depends on the individual's interests as related to survival and adaptation and is not due to the presence or not of intentions or wills. As we can see, we take a step toward a conceptualization of communication that is not merely a symbolic scenario, or even a question of social language,[10] and can much less be explained by both.

By accepting this perspective, this epigraph shows that communication is possible—at least at its lowest threshold—thanks to simple expressive acts that are already a type of relationship/involvement with the other-environment that acts as a stimulus, because otherwise it would not take place. At its highest threshold, at least with the information we have so far, communication takes place as a type of involvement through the display, intentional if there are more signs, of an individual's involvement agency. Next, we summarize schematically the characteristics of "saying" in living individuals, breaking them down according to their capacities. We have used as criteria whether they possess a brain or not, which also allows us to separate feeling and non-feeling individuals, and then whether they have intentionality, which depends mainly on the degree of consciousness.

16.7 Communication Thresholds: Minimum, Middle, and Maximum

The conceptualization of communication that we have been working on suggests that it is not an exclusively human behavior. As we can see other living beings also communicate, although it's communication is different from human. The human

[10] When talking about a symbolic scenario, we mean the platform of values, meanings, customs, and traditions that make up culture. By social language, we mean a system of representations built on the conventional, arbitrary, collective relationship through which an event or object is given meaning within a specific culture.

communication may be symbolic and not symbolic, but in other organism the communication only can be not symbolic. This basically depends on the organic capacities of each organism, whether it has a brain or only a nervous plexus, or whether it is capable of feeling or not, among other factors. For organisms without a brain, and therefore without consciousness, communication can only be stereotyped and rudimentary, as in the case of bacteria and perhaps also plants. In more developed organisms, the communication is usually symbolic to some degree, as happens to ants, rats, dogs and in general to higher mammals. These animals, by the way, have a symbolic life, but reduced, and because of their low memory capacity do not create culture and their communication, although more sophisticated than that of bacteria, is less extensive than that of the human being. The case of the human being is different because it has a large internal memory (brain) and external (culture), also has a highly developed prefrontal cortex through which, unlike other animals, can integrate their perceptions and even imagine scenarios in the future, a capacity known as anticipatory thinking and this impacts the ways in which it is expressed or communicated, expanding the range of forms and contents of human communication.

Since behaviors are activities that any living being can carry out to maintain and develop its life in relation to its environment, responding to it and [in some cases][11] modifying it (Galarsi et al. 2011, p. 99), any response to a stimulus leads to behaviors, which can be innate (stereotyped, rigid, and predetermined, since they lack external feedback) or learned (based on habits, association, and social influence).[12] Expressive behavior, which is what we are discussing, is differentiated internally depending on the mental and adaptive capabilities of each of the species and individuals related to how they respond and, in some cases, modify their environment. Thus, besides the well-known basic difference between behaviors (whether public or private, conscious or unconscious, voluntary or involuntary, usual or unusual, social or individual), the use that any given individual gives to the information that it manages to build through experience and interpretation based on its capacities, abilities, and competencies is also an important factor in its expressive action. As you can see any kind of expressive behavior is considered to be a communicative phenomena. This because expression is already communication. In non-social organisms, the expression acquires no social or interaction tints; but in social organisms it is possible to speak of social communication, although between the different species is given through different supports and forms, even contents, according to

[11] We have added the emphasis, because the quote is part of a section that refers only to human beings, which have a somewhat good ability to modify their surroundings through their behavior.

[12] We borrowed this classification from the work of Galarsi et al. (2011, pp. 95–97), who show that behaviors are organized by their degree of complexity. In general terms, habits allow organisms to learn to ignore a repeated stimulus, making them insensitive to it; next is association, where learning is done through experience, through trial and error (it also includes learning through filial influence, which has a mark of belonging), and finally, the most-complex is behavior comes about through social influence, where an individual outside of the family manages to influence the other's learning.

the capacities, abilities and cognitive and expressive competences of the organism in question.

It makes us think that communication has several levels or thresholds, which are not shown with the criteria ratings used in the field of communications studies (interpersonal, group, organizational, social, and media level) but rather are based on the degree of complexity of the expressive act itself, conceived from the expressive use of the information built by the individual in its inescapable interaction with the environment throughout its life, and thus of an obvious evolutionary nature. This proposal can make sense in terms of the third, fourth and fifth level since we understand the communication in every living being that through its vital behavior (what the designers call "the search for meaning") are expressed, communicated, before the stimuli of the environment. This implies, of course, a non-conscious reaction, but a reaction to the end that "says" the organism in question, even when there is no conscious intention to say anything. In this regard it is necessary to emphasize that from understanding communication as an act and expressive behavior, we also assume it as an expression that occurs before/through the environment, the other, the self, and not necessarily with the other. For us, communication is not a matter of dialogue or understanding, much less of intention (not intentionality) and consciousness. The communication understood as an expression is essentially a practice of saying that is motivated by the type of involvement that through saying said living beings establish with the stimulus that they construct, as a sign, as part of their life existence.

For example, when ants and bees exchange information, it is biosocial, unlike other more-psychosocial species like some birds and mammals, or other undoubtedly symbolic exchanges between some superior mammals, developed most especially in human beings. The exchange of biosocial information is that which occurs between beings that are biologically social (that is, between beings that need the other for the daily management of their life: reproduce, eat, hunt, etc.). Its function, then, is directly linked to physical, biological survival. Psychosocial behavior, on the other hand, is typical of organisms that affectively need the other to manage their individual lives. The human being is a being both biosocial and psychosocial, but not all species bear this last attribute.

The difference in these types of communicative behaviors (in Romeu 2018, we haved called symbolic and not symbolic communication) resides in the mental capability of these individuals. We talk about two big different types of communication based not on different form of expressive behavior, rather on different type of expression, according to organism, its cognitive and expressive abilities, capabilities and competence. The dividing line between symbolic and non-symbolic communication is precisely and fundamentally in the degree of consciousness and/or unconsciousness of the communicating individuals. A cell, for example, is an unconscious living organism and therefore its communication, that is, its communicative behavior can only be of a non-symbolic type. But a chicken, a frog, an elk or an elephant have symbolic communication behaviors because not only are they, in principle, psychosocial beings, that is, affectively and mentally dependent on the other, specifically the recognition of the other individual as another, but this recognition provides them with some degree of awareness that allows them to "read" the world (and all that it means in terms of recognizing the existence of others and the other, the difference) as alien and different from themselves. Hence, these animals have a social language certainly rudimentary – if compared to human social language – through which they can communicate with each other symbolically.

Ants do not have a large brain (they have a few neurons and very few synapses), so their cognitive activity tends to be programmed neurally and genetically, meaning that it is determined and based on mostly innate, instinctive behavioral patterns. Still, because ants are a social species, their expressive actions are limited to a series of stereotyped reactions that other ants of the same species can "understand" (so they have a social language, primitive as it may be). The same does not occur with solitary individuals (fungi or bacteria, for example) whose expressive actions are not only unintentional (not based on their will) but are also not completely stereotyped; they are individual, not shared.

It is known that rodent mammals such as rats do not have a large brain, but they are quite intelligent animals, so their cognitive activity both uses their innate resources and obtains other types of resources through learning. Their psychosocial development allows them to incorporate new resources that enhance their life experience and, therefore, their range of behaviors. However, the rat's small memory makes it impossible for it to hold on to this learning, so even though it can have non-stereotypical, or creative, expressive actions, what we know so far affirms that it must call upon these actions on each occasion. Dogs are a special case, as are most superior mammals and other domesticated animals, which, like rats, can learn new things, but are able to remember a much greater amount of information and share a rather efficient social language that allows them to deal with life collectively and even with other species. The symbolic nature of behaviors attributed mainly to human beings (although there is evidence of it in some superior mammals) means that the brain capacity is greater and houses a larger memory (according to Sagan 2016, the human brain appears to be superior by several million bytes). Therefore, bio- and psychosocial behaviors that the species mentioned above also have join forces with the symbolic behavior derived from the way in which representations of reality are created apart from the sensations and feelings linked to them and operate expressively through a much-richer, much-broader and much-more-abstract social language, in that it does not need a reference point in the moment.

Symbolic behavior, as the symbolic expression, also includes the faculty of reason which, as we have noted, also comes in different degrees. One of these degrees is undoubtedly the presence of verbal language articulated in the human species. As it is known, the human being is the rational animal par excellence in that it is the species that has most used its rationality, accumulating these types of cognitive or intellective experiences into what we know as culture, which also acts as an external memory drive that fills with continuous learning. The different scales of degrees that we have attempted to show through these three examples suggest that individuals' behavior has an evolutionary nature in function of the individual's capacities and the challenges that he or she must face using his or her abilities or competencies. It may or may not lead to new capacities, or to the partial modification of one, which would also possibly affect the individual's expression, because the transformation of capacities is always related evolutionarily to a transformation of abilities and competencies, which also implies a transformation in an individual's cognitive activity.

According to enactivism (Di Paolo 2015), there are three great means or ways by which an individual's cognitive activity works, or the activity used to build information or knowledge about one's surroundings, or, in some cases, about oneself. It is the metabolic means through which information is built without the intervention of complex cognitive operations, because the individual acts cognitively as if programmed based on its basic vital needs (the example of the bacteria helps show that these organisms have a physiological feature that allows them to detect and react to the presence of sugar molecules on which they feed); there is also a sensorial means, where knowledge or information is built from sensorial organs that are linked to the sensations and emotions activated mentally by the individual (for example, when a dog sniffs tasty food, its mouth waters), and a rational or intellective means through which mainly humans build information about the world using concepts to create and transmit knowledge of it.

This simple division by levels or means through which cognitive activity works allows us to divide in two the information that can be built from it—symbolic-type information (working cognitively through intellective means), and non-symbolic (working through metabolic and sensory means). We can say that communication in both symbolic and non-symbolic terms can be split into two large groups to be studied: non-symbolic communication and symbolic communication, respectively. By non-symbolic communication, we mean communication that happens through expressive actions that do not involve social or symbolic language and can therefore be placed in the lower communication threshold, which has expressive limitations for the individual in that it cannot use common or social language, since it does not possess such. We have called this non-social language or individual language, understanding language not as communication instrument, rather as cognitive, meaning an individual's own system of mental representation, derived from its experiences (some predetermined and others, learned) that are not structured socially, such that it is tied to the mental structures of each organism, leading to individual, or not-shared, mental representations. According to enactivism, all living organisms possess this type of language, and as their capacities, abilities, and competencies allow (as in the case of a baby and even of some domesticated animals such as dogs and cats), individuals can adopt and learn social language, which is useful in principle for organisms that must navigate their lives as parts of groups or societies.

Thus, without social language, it has no possibility of being understood by others of its own or another species, and involvement in the expressive sense is prevented. Non-symbolic communication is typical, but not exclusive to, so-called individual individuals, that is, individuals that can't be social, which are organisms that do not need others to survive because they take care of their own food and reproduction (plants, fungi, bacteria, protists, and some animals like sponges and coral). Because they do not need social or symbolic language, they manage their life and their expressive acts based on their mental structure, such that their interaction with the environment is programmed, predetermined, or stereotyped and not intentional, and their expressive activity is for self-management.

Another sub-type of non-symbolic communication is characterized by the sensorial way in which information is built. We have called it sense-based communication, and it is present in sentient living organisms with some level of consciousness in that they have a central nervous system. Based on their nervous activity and brain capacity, they show a mental structure whose sensory relations are activated by the sensory conditions provided by the sensory apparatus.[13] These sensory conditions oscillate on a range of feelings that go from pleasure to displeasure, in that these extremes are the minimum of sensory ability possible in sensory actions. Like what happens with programmed communication, with non-symbolic sensory communication (later we shall see that there is also symbolic sensory communication), the expressive use of information is linked to the satisfaction of an organisms' biological needs. It is therefore not a reflexive or linguistic use, which eliminates immediately the possibility of talking about expressive support and matter as a medium and message, respectively, and especially about expressive intention or understanding. Non-symbolic communication and its two sub-types (programmed and sensory) are intentional communications, meaning that they are derived from the individual's display of intentionality as a life impulse, or, if we prefer, of an organic and/or sensory reaction (depending on whether it is programmed or sensory) to the physical-natural and/or social environment where the organism in question lives.

Unlike programmed communication, sensory communication produces a performance-existential type of expressive act that is different from a programmed action in that it is not determined genetically or metabolically by organized physical-chemical processes to stay alive; a performative-existential expressive act happens as a sensory reaction to the environment. Sensory communication thus allows for the emergence of an expressive act that accounts for the organism's sensory state at a given moment, as an expressive response to a stimulus. It is possible because sensations act as experiences in organisms with some level of consciousness.[14] We can define sensory communication in these organisms as a subtype of non-symbolic communication carried out by feeling individuals equipped with different sensory mechanisms and sensory resources, and different degrees of awareness to shape their expressive acts at the medium-communication threshold. If an individual has a high level of awareness, it probably uses sensory communication from both a non-symbolic perspective (autonomy) and a symbolic one (heteronomy). Therefore, symbolic sensory communication is shaped by one of the uses the human species

[13] For example, insects and some mammals have a very developed sense of smell, whereas fish have a sharper sense of hearing. In human beings and primates in general, the most-important sense is sight, while in bats, hearing and touch are the most-predominant. Of course, a species may also have other senses.

[14] Insects are not generally feeling beings; they react to bothersome stimuli, but they do not feel pain. For example, a lizard does not feel pain when its tail is cut off, but a dog or bird does, due to the different levels of awareness in these animals.

gives it, mainly through sports, art, and social norms, because in human societies, feelings tend to be regulated in terms of cultural meaning. We can also talk about symbolic sensory communication, although it must be balanced based on the social, rational nature of all symbolic communication.

Symbolic communication differs from non-symbolic communication mainly in the type of language used (social language or not social language). Whereas non-symbolic communication is used with a language or an ad hoc system of representation built by the organism as an individual mental structure, which results in a non-intentional or non-intentioned expressive behavior, symbolic communication—attributed unquestioningly to the human species (although there is scientific evidence to the contrary, or that at least questions it)—takes place through social language, and in human beings and superior mammals, also through a symbolic language that merits an intentional expressive display. Here, we find the highest communication threshold, even though it is normally reserved for humans. Because intentionality and intent make up two behavioral aspects of living organisms whose difference lies precisely in the presence or not of volitive interests in expressive acts, in symbolic communication, the presence or not of volitive motivation (built around an achievement and an end established previously and consciously from a mental standpoint) is a natural attribute of symbolic communication at its highest level, which marks clearly a difference with non-symbolic communication that, based on the absence of will, results in a performative-existential, if not programmed, expressive act.

Intent does not work the same way in all organisms. In fact, based on capacities, abilities, and competencies, intent can be split in two: a specific, exact one, which can also be called instrumental, focused on solving specific problems that are limited to the factual reality that provokes it; and an abstract or speculative intent (usually yet illogically attributed only to humans), which above all is linked not only to the organic characteristics of the human brain but also to its huge ability to remember, and to the presence of verbal language.[15] The latter is what makes it possible to articulate not only intent but also complex mental representations, which take place through abstract processes that happen through the joining of ideas, the source of

[15] Verbal language allows us to describe and explain other languages and ourselves, so it makes possible the emergence of a system (or even group) of representations and references articulated/structured together, from which the connections between the different aspects of different languages that foster the appearance of a more-complex thinking are amplified, in that it no longer has to be for immediate situations for the sake of past, and especially, future situations. The ability to name events beyond the present scenario is exclusive to verbal language (which is not unimportant when we realize that human beings have also created technology that allows us to transmit this language culturally, besides the fact that it is immediate), and although it may turn out to be the basis for many other languages (for deaf-mutes, for example), animals—even the most-intelligent of them—lack the brain capacity to think about the long-term future, so their language is reduced to naming and understanding the world as they perceive it, and to that sparse link between signs and representations. Therefore, their speculative intent would be reduced—if they can even activate it—to exploring the present world.

imagination through the very developed sense that humans have of future expectations.[16]

Based on this information, expressive acts within symbolic communication work like intervention, or with the conscious intent of modifying the other-environment. Of course, it is not only to human beings, but humans would appear to be the most efficient at it. Linked to the group or system of representations that give a specific, socially shared meaning and reference to the reality of things in the material, social, and imagined world, the speculative world of the human individual is more far-reaching and complex than that of individuals of other species in manipulating will through agency.[17]

Different degrees of intellectuality or rationality (depending on the organic traits of their brains and the degree of expressive capacity, ability, and competencies) have different degrees of complexity in the expressive act of involvement. From this maximum threshold of communication there are complex expressive acts, especially those that tend to influence/involve the other-environment. In this way, the degree of complexity of communicative acts can be calculated based on the degree of awareness of the effects of individuals' expressive acts on the other-environment, and it is even worth analyzing efficacy, because to the extent that this effect manages to last longer, meaning to the extent that it tends to change or transform more-or-less permanently the state of aspects of a reality through conscious acts, there is undoubtedly an expressive act taking place that could manage to make a significant difference in the expressive acts of an individual or species.

This point and this point alone is what allows us to understand how transcendental communication is in human beings' personal, social and/or cultural life, and in that of other species, which forces us to look beyond our anthropomorphic noses. Perhaps, even technologically, it is where we should focus our efforts as researchers and professionals in communication from a biological and evolutionary standpoint, because only then can communication be seen fully: as nothing more and nothing less than an expressive-type behavior. Understanding the above leads then to take a different view on communication, which, without doubt, allows a greater scope. If the object of study of communication, as proposed here, is the expressive use of information constructed in the inevitable interaction of the living individual with his surroundings that results in expressive behaviors and acts by means of which an individual " says, "the causes and consequences of said saying will not be alien to this object, not only in the socio-historical level (in the case of human beings), but

[16] Will or intent, when tied to what is immediate and sensory-emotional-affective, is displayed specifically, and its instrumental nature means it is instinctive or determined. However, when will is linked to what is mediate (non-present situation) and conceptual (simply thinking: idea-idea association), it is a speculative intent because of its abstract or conceptual nature, in that it is always linked to an organism's system of symbolic representations that it stores in its memory, to be activated at specific times throughout its life.

[17] We are not using this term here in Gould's biological sense, but as Bourdieu and Deleuze's theory of agency describe it. They say that agency is the action that social actors develop consciously. We have extended and adapted the concept to all species with volition.

also its impact on the vital ecosystem in which it is inserted, be social, cultural, personal and/or natural. The potential impact of any expressive act on individuals and on their place in the real world could also surely be considered as a legitimate object of study in the field of communication studies; herein lies the basis for introducing it and setting it up as a field, because communication crisscrosses the entire vital spectrum of living individuals.

16.8 Conclusions

As we have seen thus far, the concept of communication as a behavior and expressive act is conceived from an evolutionary standpoint, understood as part of the vital acts of all living organisms as they are mediated by the expression that they are able to utter based on their different capacities, abilities, and competencies, and different interests or motivations. This, as can be seen, is far from the concept of communication in Luhmann's systems theory and also from its maxim that only communication communicates. For us, against this position, communication is only possible through living organisms, so we move away from the systemic positions that imply not only outside the scope of life, but also outside the processes of construction and information processing.

Taking this stance as a backdrop, we can state that it is the perceptive-cognitive activity of living individuals, as essentially interpretative activity, that makes up the raw material of communication, which is the information that the individual builds perceptively through its life experience. In this sense, our position is defined mainly phenomenologically; and for the biological substrate on which it rests, we have named it as biophenomenological. The criteria we use to define how communication works as a behavior and expressive act are in line with these positions. We believe there are three basic criteria in the conceptualization of communication from an evolutionary standpoint: (1) individuals' perceptive-cognitive capacity, ability, and competency in that the perception of the stimulus that requires an expressive response from the individual is based on it, (2) the expressive capacities, abilities, and competencies where the personal and social expressive resources to communicate are activated, and (3) the individual's motivations and interests when perceiving the stimulus and using the information built through it to express (itself).

Based on these criteria, we propose that the link between communication and evolution must be understood according to three basic ideas. They are: information, the expressive use of information, and interest/motivation what generates such use. These three ideas are also the levels of analysis for all behavior and expressive acts. We have defined this concept of information as knowledge, in that it is the result of individuals' perceptive-cognitive activity in their unavoidable interaction with the environment or the surroundings in which they live. In this sense, we accentuate the discordance that exists in this regard with the concept of information from which the Cybersemiotics program starts, from which information is separated from its meaning, that is, knowledge information.

For the other hand, the expressive use of information—which is what we call communication—implies using information as the raw material for expression. This also differs from the concept of communication proposed by Cybersemiotics from the postulates of Luhmann. For us, communication is a phenomenon of life, not a structure that articulates relationships and nodes of information. From our point of view, communication has an individual and a social dimension. In the individual communication occurs as performative-existential behavior, without intention, without a regulatory code of meaning and without orientation to the understanding with the other, because as a basic expressive behavior, the resulting expressive act is nothing more than Thévenot (2016) it calls modes of involvement, in which subjectivity is implied. For the program of cybersemotics, it is precisely this that makes it possible to draw the bridge between unconscious and conscious acts, because communication thus serves as a mortar between one and another state of the life system, because communication here is defined, from its bases, as a expressive act before or by the environment (with regard to the stimulus that configures it), and never with it.

Regarding the social dimension of communication, which is how it is mostly understood to this day, here is the communication thanks to its intervention attribute, that is, the potential it has to modify/transform the environment, the other or the self generates relations of sociality with the environment and not only before or by him. This distinction between the individual and social dimension of communication can be explanatory – albeit partially – of how the processing of information in unconscious organisms gives way to the emergence of meaningful communicative acts, although this sense is meaningful only to them. In the case of social communication, meaning is shared to the extent that it is collectively constructed through socialization.

Finally, the third level of analysis is the interest or motivation, understood as that conscious or unconscious will, respectively, that organisms deploy when responding expressively to the stimulus that summons said expression. This distinction between interest and motivation, which is articulated within the phenomenological discussion between intention and intentionality, respectively, it seems may also be useful to understand the interrelation between the different ontological levels of reality and the breakdown/articulation between the unconscious world and the conscious. Obviously, as we conceive rather the ontological criteria inserted in a specific epistemological perspective (which for lack of a better name we have called ontoepistemology for the moment to demonstrate the cognitive relationship that we establish with reality and from which we ontologize, especially via the language), that is why we refer to the beginning of this work that what Cybersemiotics understands as levels of reality, or different domains of reality, we think, as Maturana (2015) does, as explanatory domains of that reality, is say, cognitive domains.

Reality, as we think it, is one, although the way we approach it is to dissect it. The cybersemiotic bet to build a comprehensive theory about it, it seems to us, should not reproduce this separation and is, according to our point of view, what it does when looking for an ontological theory of information since the science itself from which it is intended to erect constitutes, as a human activity, a second order approach to that reality. Producing this difference artificially (even through logical thinking), this is what can be configured ontologically as information, but we must not lose sight of the fact that it is a construction of reality, that is, an observation of the observation that although it produces knowledge it is in any case a knowledge that is crossed by our own human subjectivities, as well as scientific, and in any case, always, it is approximate; at least from the Perennial pansemiotic perspective with which we identify ourselves.

Based on the epistemic-conceptual framework developed here, not only we urge the academic field of communication studies to broaden its range of analysis and research to areas of study that have not even been considered, or perhaps force it to refute what we have sustained, although we are aware that this proposal is lacking a more-profound explanation. But it can also help to explain the interconnection between the last explanatory levels of reality that Brier places in living systems. This is relevant for the academic field because today it is focused only in human communication and because our communication proposal builds a framework to understand communication beyond the human, and beyond understood as a process of sending and forwarding messages. Understanding communication as an expression, in its two dimensions, individual and social, also makes it possible to refer to it as a phenomenon of life, specifically as a behavior that can be read in an evolutionary key. This would insert the academic field of communication into a quite different panorama, urging it to open up to interdisciplinarity, and inserting the communicative phenomenon into a transdisciplinary paradigm.

Still, we think the most-important contribution of this epigraph is that it outlines a path forward between communication and evolution that gives form to how communication has been a part of species' long, complex evolutionary processes. We do not suggest that communication is the factor that explains this evolution. Nothing is further from our intention than that, but rather we propose to understand communication as a phenomenon of life as part of an evolutionary explanation of living systems. In the framework of a successful articulation between communication and evolution it is possible to recreate scenarios of scientific reflexivity that strategically, even allow us to think about communication, specifically human, under a teleological approach that would link it, at its base, with the emergence of culture; In that sense, that for what of the communication that keeps going around without finding a place yet from where to draw from an ethical and socially responsible perspective the projection of our future expressive actions, would thus configure an ultimate sense of human life conscious of where it would emerge, perhaps, a possible explanation of its role in the regulation and management of collective life in human beings.

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Chapter 17
Prolegomena to Cybersemiotic Discourse Pragmatics. Total Human Evolutionary Cognition and Communication

Ole Nedergaard Thomsen

Abstract The present contribution deals with the natural history of *linguistic communication* within the framework of *Cybersemiotics*, therefore the disciplinary label *Cybersemiotic Discourse Pragmatics*. The conception of evolution is as a natural ladder from language readiness to full-blown verbal communication. It is incremental; therefore, the uppermost level is integrated, full-body, multimodal, linguistic communication, embedding the preceding levels of communication. Furthermore, communication is conceived of as evolved from pre-communicative cognition, thus the term *Total Human Evolutionary Cognition and Communication*. Accordingly, a linguistic communicator is a biological *agent* (organism), (socio-)psychological (*inter-*)*actant*, and sociological *actor* (person). Conforming to the Cybersemiotic *Four Star Model*, the medial surrounds of acoustic, etc. *signals*, as context of the system, are integrated as the first 'quadrant'. *Collective* communication is not sociological *auto-poiesis*, but *sym-poietic* communicative *result* (*Discourse*) of interactants' single *Discourse Acts*. Sympoietic-Exo-semiotic Discourse is an abstract, *inert communicative mind* (*Commind*, with the actors as parts) – ongoing communication as well as past communications and communicative potential. In a game theory-like fashion, Commind is a *forum* into which communicative contributions are exported and from which negotiated agreements (*deontology*) are imported by the individual *interactants*. Thus, the model is *methodological individualist*, anchoring communicative responsibilities and liabilities with the single individual co-communicators, but recognizes an *individual-collectivity dialectics*, such that the Commind constrains the interactants, but the interactants fuel the Commind in a feedback loop.

Keywords Total Human Evolutionary Cognition and Communication · Discourse Pragmatics · Entelechy · Autopoiesis · Sympoiesis · Paideia-poiesis · Language Gaming · Communion · Practice · Tradition

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17.1 Introduction

Man is a *linguistic organism* (bio-cybernetic *Agent*, *cyborg*; Brier 2008), therefore the shorthand term *cyber-semiotic*. The basic category of biology is organismal *behavior* (*action* and *interaction*; Nikolić 2015), therefore *pragmatics*. The characteristic evolutionary layer of human cognition and communication is that of *Language Gaming*, or *Discourse*, thus *discourse pragmatics*. All this epitomized in the title as *Cybersemiotic Discourse Pragmatics*.[1] As a cybersemiotic system, a human being is a *sensory-motor* organism *generating behavior* – it is *practo-poietic* (Nikolić 2015). Sensory-motor activity is the basic level of behavior, on which more advanced levels of *praxis* are based. This means that not only *action* and discourse *production* but also *perception* (Noë 2004) and discourse *reception* as well as resultant *communication* are kinds of (inter-)action.[2] Communication encompasses *semiosis* (signification) and *energeia* (creative activity). This, again, places it in the ontological category of 'process, emergence, formation'. *Energeia* is not only *actual*, present goal-directed activity (*en-tel-echy*) but also habit/disposition (would-be behavior, *dynamis*), and result, or *potential* behavior (*ergon*).[3] Stressing the creative-emergent character of process is the term *poiesis*. With Peirce, 'man is

[1] *Cybersemiotic Discourse Pragmatics* is a "compromise" between *Cybersemiotics* and *Functional Discourse Pragmatics* (Thomsen and Brier 2014). The term 'functional' is superfluous since Cybersemiotics is functional in the first place, being a systems theory, with *structural coupling* (co-adaptation) between a system and its surroundings and the construction of a macro-system as an evolutionary *unit of selection* out of these.

[2] Perception and Action, as well as semiotic Reception and Production are 'intentional', in the sense of being Object-directed, i.e., being 'about' something (Searle 1983). Notice the difference in directedness, perception being determined by its perceived *Real* Object, communication determining ('constructing') its *Reference* Object. Sensory-motor perception and action occur in two stripes, individual and collective ('joint'). The "missing link" between Cognition and Communication is the development of a *social Mind* (*Interactant*) on top of the private Mind (*Actant*), such that the individual intentionality of the private Mind is overlaid by a collective intentionality of a social Mind, this giving rise to *joint perception* and *joint action*. The latter two are prerequisites for Communication. Communication involves interactivity and reciprocity ("intercommunication"), 'joint reception' (by the Receiver *Addressee* and Feedback Receiver *Addresser*), and 'joint action', i.e. linguistic interactivity and interaction.

[3] The triangulation, *energeia* = {*ergon*{*entelechy*{*dynamis*}}}, corresponds to a sequence of Firstness, Secondness, and Thirdness. *Entelechy*, when representing a 'stream of consciousness', is *actually occurring* semiosis (*Consciousness*). In opposition to this, there is, on one hand, *Memory* as *dynamis*, i.e. as virtual semiosis – Long-Term and Short-Term Memory, and, on the other, *Working Memory* (WM) as *ergon*. WM has a receptive, *hermeneutic* aspect in perceptual buffering and other stages in the discourse comprehension process; and a productive, *hypocritic* aspect in the different stages in the discourse production process, before and after (as a result of) the actual occurrence, e.g. its externalization in classical rhetoric's *inventio*, *dispositio*, *elocutio*, *memoria*, *actio* (*executio*/*pronuntiatio*). Similarly, compare Levelt's (1989) scheme 'from intention to articulation'. Language as 'action and interaction' is an age-old idea, antedating Speech Act Theory and Language Game Philosophy by centuries, its being already present with ancient Greco-Roman grammar, logic, and rhetoric, as represented by, i.a., the Stoics, Quintilian, and St. Augustine.

a sign' (esp. Symbol), or rather, *semiotic process*, *symbolization*, and therefore there is no *homunculus* making *use* of signs. Rather, on the level of the individual, semiosis is *active*, *self-creating* and *self-controlling*, what is termed *auto*-poiesis (cf. Maturana and Varela 1972), or *auto-semio-poiesis* (Gorlée 2009: 223).

Semiosis occurs in three stripes, *biological* (*bio-semiosis*), *psychological* (*psycho-semiosis*), and *sociological* (*socio-semiosis*), as does autopoiesis (Brier 2008; Luhmann 1995). Biosemiosis/bio-autopoiesis constitute the encompassing category, in accordance with Cybersemiotics' (Brier 2008, 2015) *methodological naturalism*.[4] Thus, the psychological and sociological varieties of semiosis/poiesis are the results of biological evolution. This is the reason for the subtitle, *Total Human Evolutionary* (biological) *Cognition* (psychological) *and Communication* (sociological). Especially the biological *autopoiesis/biosemiosis* occurring *in* the Body (*endo-semiosis*, T. von Uexküll et al. 1993) is responsible for psychological *cybersemiosis* (Cognition by private Mind, *Actant*), and in turn for sociological *cybersemiosis* (Communication by social Mind, *Interactant*). Since dyadic Communication involves the interaction of two or more social Minds, one performing the function of Subject, the other of Co-subject, and since a unified (induced, 'welded') *Society Mind* (*Commind*) of the communicative dyad is *abstract-inert* ('declarative'), not concrete-processual ('procedural'), I do not believe that the latter communicative Commind *per se performs* sociological *exo*-semiosis and *auto*-poiesis (pace Luhmann 1995; Brier 2008). Rather, the cybersemioses of the separate social Minds *result in*, conflue into, social *sym-poiesis* (Dempster 2000) and *dialogical semiosis* (Dines Johansen 1993; Ponzio 2018) of the Commind. This synergy places *interaction* and *dialogicity* centerstage (Kashkin 2012), and, retroactively, makes verbal *thinking semiosis* (Brier 2008) a kind of inner dialogue, where the functions of Subject and Co-subject are performed by different phases of the same individual's semiosis.[5]

The cyber-semiotic organism as a Subject (Co-subject) is related to an *Object* in the (esp. external) environment. Biologically, they are related in terms of *structural coupling* (Maturana and Varela 1972; Brier 2008), cognitively by way of psychological *eco-semiosis*, and communicatively by way of sociological *eco-logical semiosis*. Not only the semiotic relation differs according to the semiotic level, there are also three different kinds of Object and Universe: *Potential* Objects in the *Biophysical World* (*Umgebung*), *Real* Objects in the sensory-motor (cognitive)

[4] Life (*living*) has been equated with *semiosis* (cf. Kull 2002 and the bio-semiotic research tradition). In line with *Cybersemiotics*, I take life (*living*) to be co-defined by cybernetics *and* semiotics, as *poiesis* and *semiosis*, via the overarching *process* category of *energeia*. Cybernetics concerns the *materiality* and *mechanics* (firstness and secondness) of life, whereas semiotics delivers *thirdness*: *finality* and *coherence*. Life is both living *here and now* (*entelechy*), *past* living (dead *ergon*), as well as *would-be* life (*dynamis*: genotypicality, blueprint of living). As semiosis, it is *discursive*, *argumental*.

[5] It is even possible to provide a generalized concept of semiosis with a game theoretical interpretation and also conceive of a cosmological physio-semiosis as dialogical and discursal. Accordingly, with Peirce, evolution is a *proto-syllogistic* process (e.g. *inductive* evolution of *physical laws*, incl. *cosmological habits*).

eco-system (*Umwelt*), and *Referential* Objects in the communicative *eco-logical* system (*Social World*). Accordingly, the pivot of *Cybersemiotic Discourse Pragmatics* is *context*, and correlatively, adaptation, *Structural Coupling* (Maturana and Varela 1972),[6] control, and feedback (von Uexküll 1909). This places *context* and *contextual comparison* center-stage (Nikolić 2010). The established *contextual macrosystems* are units of selection in (co-)evolution, implying the co-adaptation and co-evolution of organisms and their environment (Laland et al. 2000).

When *modern* man communicates linguistically – produces and receives *discourse* – s/he communicates via a synchronic *stratal* system whose layers and levels correspond to *stages* of a diachronic system of *Total Human Evolutionary Cognition and Communication (THECC)*. The job, then, is to reconstruct this system as a series of integrated, nested subsystems. First Biology (Body) evolves Cognition (Mind), next Cognition evolves Communication (esp. perceptual *presentation* evolves communicative *re*-presentation), and within the latter, several substages of the evolution of verbal-symbolic Communication, or *Language Gaming*.[7]

In a wider perspective, Cognition and Communication, as a kind of semiotic *praxis*, co-evolves with (non-semiotic) *sym-praxis*. For instance, the evolution of technology (*allo*-poiesis, *techno-poiesis*) goes hand in hand with the evolution of Cognition and Communication.[8] On the level of Language Gaming, verbal *Practice* co-evolves with social *Sym-practice* (yielding lingua-practical *Society*, integrating these strands). Since we view Communication evolutionarily, Languaging Semiosis integrates several semiotic media into a common "Body Language", i.e. we see Languaging and Gesticulation as an integrated *multi-modal* communicative system (Zlatev 2014b). Also, the arts and other semiotic media are kinds of semiotic *Praxis* functioning as *Sym-praxis* with respect to Languaging, especially Language Gaming (sometimes even eclipsing language, as in panto-mime). Therefore, the Mind is multi-modal and multi-medial.[9]

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[6] "We speak of structural coupling whenever there is a history of recurrent interactions leading to the structural congruence between two (or more) systems." (Maturana and Varela 1987, p. 75)

[7] This makes the humanities and social sciences part of the natural and life sciences, cf. the methodological, or *absolute naturalism* of Cybersemiotics (Brier 2011). Notice here the processual term *Language Gaming* – it is meant as a processual counterpart of 'language game' (Wittgenstein 1953).

[8] For instance, the *allopoietic* evolution of writing (from inscription to Computer Mediated Communication) – as an instance of the history of technology – is integrated with the evolution of lingua-semiotic Cognition and Communication (influencing the constitution of the Modern Mind). In another dimension, social situations may require a dress code as well as a lingua-stylistic code of formality. Here, clothing has developed from being *biologically* prosthetic to being *semiotically* sympractical. Similar may be said for food, as being transformed into a cultural-semiotic, civilizational phenomenon.

[9] Anticipating a later section, we shall say that semiotic Praxis and non-semiotic Co-praxis unifies into an *interface* system, in relation to a common, medial Context. The *Interface* is the center ("knot") of the model. Notice that semiotic Praxis is multi-modal. Anticipating again, Languaging Semiosis evolves from Mimetic Signaling into Sign Playing, and the latter bifurcates into Gesturing (including the previous stage) and *oral* (or, *manual*) verbal (Sign) Language Gaming. *Verbality* (symbolicity/logicality) represents the evolutionary innovation.

17.2 Propaedeutics – From Metabolism to Symbolism

In confrontation with an organism-*external* (unknown) environment, *Umgebung*, biological organisms with composite sensory-motor contextual *background* competencies construct, on one hand, a homey behavioral outer subjective *Umwelt* that is relevant to them, and on the other, both a subjective first-person experiential, phenomenal *Consciousness* mirroring this confrontation simultaneously and an internal *Gegenwelt* (knowledge base/Memory), modeling and categorizing the *Umwelt* more permanently (von Uexküll 1909; Brentari 2013; Sebeok and Danesi 2000).[10]

1. *Umgebung* > < Organism [*Background*[11]: PNS: *Merken–Wirken* & CNS: *Merkorgan–Wirkorgan*] →
2. *Umwelt* > < Organism [Consciousness & Memory: *Gegenwelt*][12]

Levels 1 and 2 constitute the basic, initial stages of the *propaedeutic* layer of THECC and feature *semio-genesis*, the evolution of *triadic* bio-semiosis, *eco-semiosis*, involving an *Umwelt* (stimulus) Object which determines an organism-internal sign-of-cognition (impression, *Sensation*), this in its turn determining its likewise organism-internal cognitive interpretation (*Sense*). In the sensori-motor interaction between the environment and the Background competencies, the emergent *Sensations* as *Merkzeichen* and *Wirkzeichen* (Signifiers) project onto their Signified obsistent *actual* Objects in the *Umwelt* sensory-motor *sensational qualities* – *Merkmale* and *Wirkmale* – which come to be perceived as features *of* the perceived Objects. In this way, the *Umwelt* of the organismal Subject becomes 'colored' by the Subject and thereby (re-)cognizable and behabitable. Ecosemiosis is a bidirectional transformation, whereby the *Umwelt* comes to function as *Signification Sphere* (Brier 2008) and its internal model as *Gegenwelt*. The impressions in consciousness of the actual *Umwelt* Object are *intentionally* directed at it. By repeated interaction, the actual Object is categorized and stored in Long-Term Memory as categorizing modal *type* (*Generalized* Object). These types are monitored in

[10] Notice that an Organism also perceives and operates upon itself, thus being on one hand, 'unknown' *Umgebung* to itself (stranger), on the other becoming an *intersubjective* sensed body with an internal correlate (*body image*). Notice also the distinction between *extero*ceptive senses (sight, hearing, smell, touch, taste, balance), *intero*ception (perception of inner organs, pain, stretching), and *proprio*ception (perception of *own* body's posture, of the organs' relative positions, of locomotion). Notice, too, that the biological organism, on the basic, *preconscious* level, is *structurally coupled* with the *Umgebung*.

[11] The Background is more than the sensory-motor Peripheral Nervous System (PNS) and the Central Nervous System (CNS); it also includes hormonal and immune systems, an integration comprised by *biological autopoiesis*/body-internal *endosemiosis* (Uexküll et al. 1993).

[12] *Merken* (sensory; cf. Interpretation) and *Wirken* (motor; cf. Utterance) develop understanding and knowing (presentational Consciousness) and Memory (knowledge, know-how, disposition).

perceptual *recognition* (e.g., seeing X as *belonging to* the sensory-motor *category* of elephant).[13]

- 1′. *potential* Object > < **Organism [**Background: PNS: *Merken–Wirken* & CNS: *Merkorgan–Wirkorgan***]**
- 2′. *actual* Object [Merk- + Wirkmale] > < **Organism [**Consciousness: *Impressions* [Merk- + Wirkzeichen] - * - Sense; Memory: *Sign* - *virtual* Object - Interpretant**]**

Owing to this transformative correlation between sensory-motor *qualities* (*Merkmale* and *Wirkmale*) of the *Umwelt* Object and its organism-internal *impressions* (*Merkzeichen* and *Wirkzeichen*), *Eco-semiosis* constructs a semiotic macro-system, an *eco-semiotic system*, where the Object is the Signified, the impressions the Signifier, the object qualities (sense stimuli) the Sign Vehicle; and as a surplus, a *Sense* as semiotic Content is assigned to the Signifier as Expression (cf. von Uexküll 1909, p. 192). As (partially) operating in actual consciousness, ecosemiosis represents *entelechy*, and thereby it induces a psychosemiotic *Gegenwelt* Habit (*dynamis*, Long Term Memory), where the actual conscious impressions (*Sensations*) are stored as *virtual* Signs (*Presentamina*), the actual conscious interpretational *Senses* as virtual *Interpretants*, and the *Umwelt* Objects as induced conceptual (virtual) *Gegenwelt* Objects (categories).[14] The consciousness-internal part of ecosemiosis, i.e. Sensation – Sense, constitutes *Pheno-semiosis* (Brier 2008) (Table 17.1).

Table 17.1 The combined triadicity of dyadic internal *phenosemiosis* (Sensation – Sense) and triadic *eco-semiosis* (Real Object – Sensation – Sense)

Eco- & Pheno-semiosis	**Context [Neutral]**	**Signification Sphere [Subjective]**	**Consciousness**	**Memory** [Habit, Virtual]
Object (second)	*Umgebung* potential object	*Umwelt* real object (signified)	___	*Gegenwelt* object (type)
Sign (first)	Matter (properties)	*Merk-/Wirk-Male* (sign vehicle)	Sensation (signifier)	Presentamen
Interpretant (third)	___	___	Sense	Interpretant

[13] Notice that, perhaps, some virtual Objects and their interpretations are inborn ("preinstalled") so that some instances of perception are really proto-abduction (an innate skill) and apply *a priori synthetic* Universals, as in language acquisition (cf. Andersen 1973).

[14] This means that in "defective" *phenosemiosis* (e.g. hallucination), a pheno-semiotic habit is actualized into Consciousness, with a Sensation and a Sense, but in want of an actual *Umwelt* Object corresponding to the recalled virtual *Gegenwelt* Object – as when the remembrance (recall) of a beloved one makes you actualize him/her as an *Umwelt* Object (seeing one who isn't there, or mistaking someone for another). Thus, the perceptual Signification Sphere is a *projection*, and this may be the background for the *constructional* character of the *Reference* Object at the level of Communication.

The opposition between 1 and 2 above is an opposition between a *biological* level characterized by *biological autopoiesis* and a *psychological* level characterized by *psychological autopoiesis*.[15] Consciousness (on level 2) is characterized by *individual intentionality*, i.e. *directedness* towards an intentional, *Real* Object in the *Umwelt*. Level 3 – the level of Evolutionary Communication, or *Languaging Semiosis* – is a *social* level where autopoiesis is the individual *Discourse Acts* of Reception and Production. The tos and fros of such acts by the Subject and Co-subject *construct* collective *Dialogues*. The communication inherent in these latter, the *semio-poiesis* of the communicative dyad, is not an *auto*poiesis but a resultant *sym-poiesis* (Dempster 2000), a social *coordination* of the autopoietic individual *Interactants*.[16] Such an actant, on the social level of Evolutionary Communication, in addition to its individual cognitive intentionality (directed at/about the Umwelt *Real* Object, Cd), also shows *collective communicative* intentionality, i.e. directedness towards a co-communicator Cosubject (*Other Mind* in the *Mitwelt*, 'co-world') *plus* a *Reference Object* (Dc) located within the *collective* dialogical *Social World* (*Überwelt*, D), resultant of the unification of the communicative dyad into a *Commind*. Subject and Cosubject are symmetrical and reciprocal, which means that both Interactants A and B include *immediate* Semiotic Objects, Ac and Bc, determining the Reference Object (Dc). The "missing link" between private sensori-motor Cognition and collective Communication is the evolution of *social Cognition*, found in *joint attention* between perceiving Subject and Cosubject (Tomasello et al. 2005) as well as *joint action* (Gilbert 1990). Thus, in addition to *individual* sensory-motor *Real* Objects, there are also *collective*, shared Real Objects (Cd). These constitute 'conditions for description' (Dc → Cd). Each cognitive actant projects it own *Individual* Signification Sphere, and additionally, as

[15] Notice that I do not take *cognition* as a defining characteristic of biological autopoiesis as do Maturana and Varela (1980). Rather, I consider the biological level as *mind-less* (providing the viability of speaking of a '*minded* Body'), relegating Cognition to the second, psychological level of psycho-poiesis/semiosis – and Communication to the third, sociological level of socio-poiesis/semiosis. Thus, there are pre-cognitive, 'metabolic' interactions between an organism and its *Umgebung*. The crucial point is the evolution of *conscious* sensory-motor interactions, turning the objective environment into a subjective *Umwelt* in perception-action. At this psychological, *constructive* level, the organism and its perceptual-actional 'cognitive domain' (*Umwelt*) *co-emerge*, in the sense that a *Mind* (Consciousness and Memory) is developed "in" (of) the organism *in tandem* with the *Umgebung*'s turning into a sensory-motor *Umwelt*. A transmutation *ana-poiesis* (Nikolić 2015)/*intra-semiosis* (Brier 2008) connects the biological and the psychological levels. (For another stratification between autopoiesis and cognition, see Bitbol and Luisi 2004.)

[16] On the layer of *Language Gaming*, the Communicative Acts are *Discourse Acts*, including acts of *Reception*. Accordingly, there is individual, *atomic Communicator*-centered Communication – sociological *auto*-poiesis, and derived, collective, *molecular* sociological *sym*-poiesis (resultant, collective *Discourse*). Thus, atomic social acts *co-constitute* molecular social interactions. The social *Interactants* are *cooperators* in communication and subject to *Principles of Cooperation*. An important development in Languaging Semiosis is then that of cooperation and (reciprocal) altruism, making exchanges of information possible (cf. Hurford 2007). Cooperation is a beneficial evolutionary accomplishment since it fights conflict. Notice Peirce's final evolutionary principle of *agapistic love*, building upon *eristic* competition (*ananchism*) and evolutionary chance (*tychism*).

cognitive-communicative Interactants, they project *Collective* Signification Spheres, for *Real* Objects in joint attention/action and for *Reference* Objects of Communication. Evolutionarily, *transmutations* connect private Cognition, social Cognition, and collective Communication in a *tristratal* system.[17]

There is a *functional circle* (Uexküll 1909) between the *Umwelt* and the sensory-motor dispositional Background, to the effect that the *Umwelt* is partitioned into a *significant* perceived *Merkwelt*, and a *significant* effective *Wirkwelt*. The outer *Umwelt* is recognized (perceived and acted upon) owing to its discriminative 'marks' (meaning, e.g., eatable, potential mating partner). The sensory-motor interaction not only results in this external, subjectively colored *Umwelt* but also produces, internal to the Subject, *intra-semiotic* mappings. Thus the *Merk*welt (Ca) and *Wirk*welt (Cb) of the sensory-motor Subject is reflected intra-subjectively as procedural sensory-motor Consciousness and Memory. The Subject then embeds a feedback *interface* (cf. von Uexküll's (1909) *neuer Kreis*) between the sensory part (*Merkorgan*) and the motor part (*Wirkorgan*) of the mind/brain.

Just as the *Umwelt* is the result of applying the Background to the environment (*Umgebung*), the *Mitwelt* is the result of the Addressee's (A) communicative awareness of the Other Mind as Addresser (B). Intra-subjectively, this gives rise to a *Spiegelwelt* of this other mind. And reflexively, due to the awareness of oneself as Addressee, the Subject harbors a subjective *Eigenwelt*. Opposite of the *Real* World (*Umwelt*, C), we have the *Social* World (*Überwelt*, D), where the Interactant Subject (A) and Co-subject (B) are projected as social *Interactors – Interpreter* (D_A) and *Utterer* (D_B), respectively. This is the *extension* of the Subject and Cosubject as an inter-personal *Intersubject*, the social dyad $\{D_A – D_B\}$. Likewise, their intra-personal, immediate semiotic Objects (Ac and Bc) are projected as the extensional *Referential* semiotic Object (Dc). {Dc} is their *Reference Domain*, or *Universe of Discourse*, the Referential Context of their communication. The Utterer (D_B) delivers the *Utterance* (Da), the Interpreter (D_A) the *Interpretation* (Db), the *Reference* being collateral (Dc). The collective communication, {Da{Dc{Db}}}, is *sym-poietic* rather than autopoietic and represents *synergeia*. (Its traces are *synerga* which may be recorded, e.g. as a corpus of texts.) It is governed by a *declarative* community Dialect (Dd).

Ontogenetically, Consciousness and Memory of organismal subjects are autopoietic (self-productive), triggered by this confrontation of Background with environment. Consciousness features present and *recalled* past experience (from *Memory*). Due to the Intentionality and Imaginativity in the Background, also fiction and planning occur in Consciousness. What this means is that Background is a kind of Peircean *potentiality*, comprising prerequisites of imagination, creativity, spontaneity, and conativity; as well as collectivity and conventionality, i.e. the tendency to develop habits. Organismal Background and *Umwelt* constitute the

[17] Notice that the Peircean categories of firstness, secondness, and thirdness seem to underlie this system: private Mind – firstness; social Mind – secondness; and collective Communication – thirdness.

propaedeutic basis of *Total Human Evolutionary Cognition and Communication* (THECC), wherein Consciousness and Memory in turn are the prerequisites of *Languaging Semiosis*.

THECC is an *integrated* evolutionary system, such that each level/layer comes to include the next-following one(s), whereby the totality ends up being a closed *synechistic* stratal system, for which I propose the cyber-semiotic terms *Para-poiesis/Peri-semiosis*. This *closure* of the system is evidenced by the multimodality and whole-body character of communication, as well as by the *reflexivity* of Language Gaming, with its meta-level of *Tradition* and the object levels of *Communion* and *Practice*. The upshot of the above is the following partial architectonic of THECC:

- Environment (*Umgebung*: *Potential* Object)
- 0. ***Propaedeutic*: *Semio-genesis*** (Structural Coupling; Para-poiesis/Peri-semiosis)
- I. Background (Central and Peripheral Nervous Systems: Bio-cybersemiosis)[18]
- II. Surroundings [*Umwelt*: *Real* Object of *Eco-semiosis*; *Überwelt*: *Reference* Object of *Eco-logical Semiosis*]
- III. ***Evolutionary Cognition*** (Psycho-cybersemiosis; *sympoiesis*: joint attention-action)[19]
- III.1 Consciousness [*Pheno-semiosis*: Sensation - * - Sense; *Eco-semiosis*: Sensation - [*Real Object] - Sense]
- III.2 Memory [*Mnemo-cybersemiosis*[20]: Presentamen – *Gegenwelt*: Generalized Object – Interpretant]
- III.3 ***Evolutionary Communication*: *Languaging Semiosis*** (Socio-cybersemiosis; sympoiesis)

First, the biological organism is *structurally coupled* to the environment (e.g. in terms of biochemical ingestion, growth). Second, we have an organism-internal process of somatic *endosemiosis* (Uexküll et al. 1993; Brier 2008). Thirdly, a psycho-somatic transmutation, *ana-poiesis/intra-semiosis*, brings us from the Body to the

[18] Sensory-motor, curiosity, imaginativity, spontaneity, creativity, conativity, collectivity, and conventionality are essential ingredients of the (biological) Background. *Curiosity* is the drive of the biological Subject of getting himself into situations where he may become surprised – the basis of search, investigation, and abduction – and herein language acquisition.

[19] Notice that Consciousness gets upgrated from cognitive to communicative via the evolution of Languaging Semiosis. Non-verbal 'thinking', *Noo-semiosis* develops, on the layer of Languaging, out of the *Phenosemiosis* of basic Consciousness. This, in turn, develops, on the level of Language Gaming, into verbal *Thinking Logo-semiosis*. Thus, reasoning without words is found in nature fundamentally (cf. Maturana 1970) and is a prerequisite for the evolution of intelligence in speechless animals (hominids as well) and prelinguistic infants. Notice, too, that *joint attention-action* is really the transmutational zone between private Cognition and (collective) Communication, where collective intentionality and intersubjectivity have evolved.

[20] The term *Mnemo-cybersemiosis* indicates that memory storage involves interpretive formation, as evident from e.g. witness psychology.

(private) Mind.[21] The sensations and intentions in Consciousness are realizations of the biological Background capacities; the *Gegenwelt* (*Counter World*) a reflection of (interpretational categorial scheme for) the *Real World*. Communicative Consciousness is intersubjective, involving esp. *collective Intentionality*. Communicative Consciousness gets upgrated progressively from reflex-based *emotional* over *motivational-instinctual* to *intentional-rational discursive* Consciousness. Correspondingly, the Modeling System of the Memory (*Gegenwelt*, Habit) is equally upgrated with a primary-iconic *method*, a secondary-indexical *ethogrammar*, and a tertiary-symbolic *language gaming competence*. And, furthermore, the referential *collective-cultural* Signification Sphere, developed on the layer of *dialogical* Languaging Semiosis, is progressively upgrated as *Spheres* of *Reflexive Mimetic Signaling*, *Instinctual* Sign Playing, and *Dialogical-Conceptual* Language Gaming (cf. also Brier 2008: 400).[22] This means that the character of perception changes since the interpretations (Senses) of the percepts get "colored" by the Interpretants of the different evolutionary levels of Communication.[23]

Languaging Semiosis differs from perception in that the semiotic means of expression in Languaging are not properties of the intentional *Umwelt* Object but

[21] Notice that I diverge from Brier's (2008, 2011) triangulation in that I have all of his communicative levels belonging with the uppermost, *social* level. This means that his lowest communicative level, *Cybernetic Languaging through Signals* (*Signaling*) – which is biological in his model – is ***socio***-*psycho*-biological in my, thus evincing the lowest degree of intersubjectivity and also Consciousness (cf. *emotional contagion*), just above the level of biological structural coupling. His ethological *Sign Games* are in my model also (bio-psycho-) social, however only of a medium degree of intersubjectivity. His *Socio-Communicative Autopoietic Language Games* are of the highest degree of intersubjectivity. The second difference is that I operate with *individual* contributions (turns), which are *auto*-poietic (*idio*-semiotic) – e.g. *Discourse Acts*, versus *collective* results, which are *sym*-poietic – e.g. Language Games (Conversations). The upshot is that my model is monotonic, *synechistic* – the (socio-)biological level developing socio-psychology, this in turn developing *sociality*. These levels are thus nested in a *genus proximum-differentia specifica* hierarchical structure: Biology ⊆ Psychology ⊆ Sociology. Thus, even the social level is biological and psychological. The = part of inclusion is due to the fact that *THECC* is a *synchronic* system; that is, our basic biology and socio-psychology are deeply influenced by our Language Gaming (we are 'symbolic' organisms). We are born as *linguistic* beings with a species-specific Human Language Faculty in want of a historical language that we have to acquire. Notice again that all three communicative levels are equally *socially* autopoietic and *sym-poietic* – social "autopoiesis" is not restricted to the level of Language Games. This means that even animals not having developed Language Gaming still establish social groupings ('societies', *Nexus*), via sympoiesis – although of a lower degree of intersubjectivity – e.g. dogs' Mimetic Signaling and playing Sign Games with each other establish a (transient) *Nexus* (Palagi et al. 2015).

[22] The Sphere of Reference (Dc) on the level of Language Gaming I term *Universe of Discourse* since the characteristic unit is the sympoietic resultant Discourse. It is projected by mental *ontologies*, successively built up from projections of the Interlocutors' immediate semiotic Objects (Ac*Bc) during Discourse Acts.

[23] From our point of view, linguistic categorization is decisive (feedback from communication to cognition; cf. *Linguistic Relativity*). Even action (as a Sym-praxis) may change, e.g. from basic chasing, fighting, and killing into cultural, rule-governed behavior (e.g., not breaching *jus belli*).

independent *Sinsigns*, i.e. *representatives* of the intentional Real Object.[24] As shown in Table 17.2 below, Languaging differs conspicuously from Perception in that the 'sign' is *re-presentational* in Languaging but *presentational* in Perception, which means that in the latter case there has to be a perceptual Object present (Cd), causing the Sensation (Aa, *Merkzeichen*), whereas in the former case the denoted Reference Object (Dc, *Bedeutung*) may be (physically) absent (*Ca), since it does not *cause* the Sign. Correlated with this, in Perception there is no *actual* Object *in Consciousness* (*), whereas in Languaging there is always an *immediate* Semiotic Object (o) there, implying that one can always communicate about something which is absent (Bc > Dc), or not even existing in the perceptual *Umwelt* (*Cd).[25]

Another important difference between *perceptual* eco-semiosis and *communicative* eco-logical semiosis is that the former semiosis is abductive,[26] whereas the

Table 17.2 The parallel between cognition and communication. Note the conspicuous absence (*) of an immediate object **o** in perceptual Consciousness

	Discrimina	Signification sphere	Consciousness (actual)	Memory/Habit/Code (virtual)
Perception	**[(Sign vehicle**	***Real* object, Cd)**	Impression – * – *Sense*]	*Presentamen* – Type-object – Interpretant
Languaging	Sinsign (Da)	*Reference* object (Dc)	**[**Expression – **o** – Sense**]**	*Representamen* – Type-object – Interpretant

[24] Peirce/Jakobson: *Aliquid stat pro aliquo alicui* (*aliqua re*) 'Something (*Sinsign*) stands for something else (*Bedeutung*) for somebody (*Subject*) (with respect to something)'. Notice that the communicative *Sinsign* may resemble the perceptual *Sign Vehicle* of the Signified perceptual Object, as in *iconic* onomatopoiea. In the case of a naturalist painter/sculptor (as the basis of *pictorial communication*) observing an Object (the nude 'model', i.e. the Original as perceived *Real* Object, Cd) and painting (figuring) it, i.e. creating a *Communicative* Object of art (the picture/sculpture, i.e. the Copy, Da), there clearly is a differentiation between the two sub-objects, the person depicted (*Real* Object) and the picture/sculpture representing her (*Communicative* Object). Notice the iconic semiotic relation of similarity between the Original and the Copy. Notice also the differentiation between the nude as a perceptual, *Real* Object (Cd) and as a *Reference* Object (Dc) of artistic Communication. In fact, the artist creates the *Reference* Object (Dc), which he then "copies" with his artistic *Communicative* Object (Da). The various communicative-stylistic conventions define the degree or kind of similarity (*mimesis*) between the *Real* Object perceived (Cd) and the *Reference* Object conceived (Bc > Dc) as represented by the *Communicative* Object (sculpture/painting, Ba>Ca). In any case, the *Reference* Object is a *fiction*, art being defined by a *fabulating* function (Ross 1968).

[25] That is, I believe that *fictionality* (creativity) is a potentiality from the very outset of the evolution of Languaging, perhaps only to emerge at the layer of Language Gaming (*narrativity*). The immediate Semiotic Object (Ac*Bc), whenever there is a corresponding *actual perceptual* Real Object (Cd) corresponding to its *Reference* Object (Dc), may associate the perceptual Real Object (Cd), via the latter's conscious Sensations and Senses.

[26] Abduction, not in the sense of *conscious* 'inferencing', but as *proto-abduction* (cf. Pietarinen 2005). In fact, Perceptual Cognition, *eco-semiosis*, takes the *Real* Object and delivers a Presentation of it, whereas *Referential* Communication, *eco-logical semiosis*, takes a corresponding Representation and *constructs* a *Reference* Object. There is, accordingly, a difference as to the

latter is not only abductive, as in Utterance reception (Comprehension), but also deductive, as in Utterance production (Intention). The Expression in *productive* Languaging is a *motor representation* (Ba), its actualization by the peripheral system is to use the whole Body as articulator/semiotic display/Source of intersubjective Sinsigns. In Reception, the relevant perceptual organs are used as Receptor, generating *sensory representations* (Aa). These two modalities are neutralized in the *declarative* Code as *amodal Representamina*.

An overarching difference between Representation and Presentation is that Representation is embedded within a triadic relation of *Mediation* between the Subject and Cosubject with respect to the Object concerning the *communicative Mood* of individual dialogical semioses. Mood is a kind of *energetic* Utterance Meaning in Consciousness, assigned as a *Force* (Searle 1969) to the Representation. Representation is *categorematic* whereas *Mood* is *syncategorematic*. The Representation *indexes* the Reference Object, the Mood the Interpreter and the Utterer as well as their type of communicative interaction in the Social World. There are different kinds of Moods on the different stages in the evolution of communicative interaction: symptomatic *emotion* is the primary mood at the lowest level (Emotional Signaling); at the medial level (Sign Playing), instinctual *motivation* is primary, whereas illocutionary *reason* (intention, point) is essential at the uppermost level of Language Gaming. Perceptual Cognition involves *dyadic* Mood since the Perceiver Subject necessarily is in an attendant mood, e.g. feeling hunger, being in heat, which 'colors' the perceptual Object as a *significant* Real Object (Cd, *Umwelt*).[27]

Human Languaging is an evolutionary tri-stratal process, of integrated, nested levels of simultaneously functioning reflex-based *Mimetic Signaling*; instinctual-motivational ethological *Sign Playing*; and premeditated, intentional-rational socio-cultural *Language Gaming*. So, playing Language Games is what we are doing all the time but this implies simultaneously also performing Mimetic Signaling and playing Sign Games on the basis of an intentional-phenomenal Consciousness

intentional *direction* between the Mind and the World, the *Real* World in the former case, the *Social* World in the latter. This difference in direction is also stressed by the fact that perceptual sensations are *im*-pressions whereas communicative representations are *ex*-pressions. Notice, however, the *complementarity* between sensing (A) and operating (B) inherent in the concept of a sensory-motor organism. Thus, in fact, sensing is proto-abductive, operating proto-deductive. This complementarity is repeated in the distinction between Reception (A) and Production (B) on the level of communicative Languaging Semiosis.

[27] In joint attention, evidently, there is a Cosubject-awareness present, thus adding a valency to the bivalent individual perceptual Cognition. If we want to distinguish between *intentionality* and (*inter*)*subjectivity*, we may say that individual Cognition (Presentation) involves *individual intentionality*, whereas collective Cognition (joint attention) and Communication involve *collective intentionality*. In opposition to this, (*representational*) Communication involves *intersubjectivity*, individual and collective (*presentational*) Cognition being *subjective*. Thus Cognition has *subjective* Mood, Communication *intersubjective* Mood. This means that the eco-logical semiotic *Reference* Object ('Ding für *uns*', in Social World) is intersubjective ('interobjective'), the eco-semiotic *Real* Object in the *Umwelt* is subjectice ('Ding für *mich*') – the Potential Object being 'objective' ('Ding *an sich*').

directed at the surroundings, and by applying Background capacities, including ontological Modeling Systems. Communication is *multimodal Languaging Semiosis*, based on Consciousness and Memory (Habit).

- III.3 ***Languaging Semiosis***
- III.3.i Mimetic Signaling [emotional, reflex-based → method]
- III.3.ii Sign Playing [motivational, instinctual → ethogrammar]
- III.3.iii ***Language Gaming*** [intentional-rational, conventional → communicative competence, including lexico-grammar]

17.3 Between Private Cognition (Perception-Action) and (Collective) Communication

Preverbal Languaging evolves into verbal Language Gaming via the evolution of cultural learning, *paideia-poiesis*. Therefore, I have termed the stages up to this point *pro-paedeutic* ('before cultural learning'). An important achievement here is the evolution of a 'shared', *intersubjective*, social Mind out of a purely subjective, private Mind and of *collective intentionality* out of individual intentionality (Tomasello and Carpenter 2007). This is so because dialogical Languaging Semiosis presupposes the existence of *social Minds* (Ad, Bd) that are welded (unified) on a public level (D). The Consciousness of Languaging organisms is social-communicative, *dialectical* (Ad, Bd), developed on top of private Consciousness. With respect to their objective Contexts, these conscious *Actants* (*Interactants*) perform, respectively, communicative *eco-logical* semiosis, as well as sensory-motor *eco-semiosis*. As hinted at above (fn 27), there is a kind of public sphere, triggered by joint attention, within the Object zone (cf. *das Ding für uns* in the Social World) as well as an "objective-objective" sphere (cf. *Ding an sich*). It is the former that is interesting here, *shared attention*, *collateral experience*, *joint action*, and the like (Gilbert 1990). The difference from the *Reference* Object (Dc) is that the *Shared* Object (C_A*C_B) is not a communicative, representational object but a perceptual-actional, *presentational* object, leaving *impressions* within the Consciousness of the Subjects/Co-subjects, instead of being correlated with expressions. Whereas the *Umwelt* is *individual*-perspectival (species-specific, subjective), the *collective* Signification Sphere in joint attention-action is *collective*-perspectival, the individual's attention-action being "shared" and thus social, collective.

Sensory-motor *Agents*' interacting with their *Umgebung* yields, *externally*, Real Objects, perceived (Ca) and manipulated (Cb), and, *internally*, a *Counter World* opposite number. The Cb aspect develops into being a target of *pointing* (rather than grasping), whereby an index finger or gaze, or lip, comes to function, not as perceptual *Real* Object in presentation but as 'attention director', i.e. *mood function* in mediated representation. The subjective *Ac* part is *receptive* (perceptive), the co-subjective *Bc* is *productive* (directive). In effect, this is *Imperative* Pointing (Gärdenfors and Warglien 2013: 30 f.) whereby an Observer perceives an Object in

Umwelt and directs the attention of another organism to the same Object by pointing at it. Imperative Pointing is simultaneously physiological *Wirken* in response to own Perception and initiative *expressional* Gesticulation. Pointing is an embryonic Sinsign, a *conative Signal*, meaning, say, 'follow the direction of my *pointer* (index finger, gaze, or lips) and fasten your attention to the target Object'. It is thus a kind of "missing link" between perceptual *ecosemiosis* (individual seeing without attendant pointing) and full-blown *Emotive* Declarative Pointing, the securing of reciprocal, joint attention with focus on their shared *emotional* psychological states (cf. Mimetic Signaling, below). The *Context* (C) is, in addition to being ego-centric *visual* space of the Pointing Co-subject (Cb), and derivatively of the Receiver Subject (Ca), also a shared *emotional* space of the Pointing Cosubject and the Receiver Subject (collective). The next level is the level of *Goal-directed* Declarative Pointing (cf. Motivational Sign Playing, below), and the final level is the level of Declarative Pointing *Composed with Words* (cf. Language Gaming, below).

- III.3 ***Languaging Semiosis*** – <u>*Imperative*</u> <u>Pointing</u>

- (Gärdenfors and Warglien 2013, p. 30 f.)
- III.3.i Mimetic Signaling – <u>*Emotional*</u> <u>Declarative Pointing</u>
- (Gärdenfors and Warglien 2013, p. 32 f.)
- III.3.ii Sign Playing – <u>*Goal-directed*</u> <u>Declarative Pointing</u>
- (Gärdenfors and Warglien 2013, p. 34 f.)
- III.3.iwii ***Language Gaming*** – <u>Declarative Pointing</u> <u>*Composed with Words*</u>

- (Gärdenfors and Warglien 2013, p. 39 f.)

17.4 The Architectonic of the THECC System and the Disposition of the Chapter

We have claimed that *Total Human Evolutionary Cognition and Communication* (THECC) is a series of nested systems of Cognition and Communication. Herein Consciousness and Memory are combined, nested sub-systems, products of the Central Nervous System. They are two phases of *Mind*, viewed as a *psycho-semiotic* process, *energeia*, Consciousness being actual *entelechy*, Memory virtual *dynamis*. THECC is performed by human Subjects being simultaneously emotional, reflexive *organisms*, motivational *individuals,* and, finally, rational socio-cultural *persons* with free will and liability. The Minds of human communicating Subjects feature primary, secondary, and tertiary *intersubjectivity*, corresponding to the three evolutionary stages. Communication is based on *dialogical connection*, *Nexus*,[28] between

[28] Recall that communication is a combination of representation (adducing perceptual presentation) and *mediation* (cf. Language Gaming's *Communion* which has focus on dialogical connection), the latter concerning the kind of *connotative* relation of the *Addresser* (his communicative point, or mood) to the *Addressee*, concerning the *denotative* representation. Communication is 'atomically'

a given Communicator and his Co-communicator in given communicative-interactional situations. In *Mimetic Signaling* the *Nexus* is reflexive-emotional, in *Sign Playing* instinctual-motivational, whereas in *Language Gaming* the coupling is socio-culturally rational-*conventional*. Communication projects *groups* of communicators with the same kinds of properties: reflexive-emotional groups (a school of fishes), ethological-motivational groups (stimulus-response couples, in flirtation, mating), and dialogical, *discourse-pragmatic we*-groups (groups of first persons, *ego*'s, in discussions/conversations). The communicative competences (*Habit*) of the subjects are likewise nested systems, of reflexive-emotional methods, motivational ethogrammars, and language-gaming *discourse-pragmatic* and *lexico-grammatical* competences. These communicative competences comprise modeling ontologies (knowledge systems, encyclopedias, Searle's 1983 Network) concerning semiotic Objects plus Signs and Interpretants (constituting triadic representational semiotic Habits) and are aggregated to and integrated with the Background capacities as well as the perceptual Cognition competencies.

Communication is performed according to a turn-taking system and implemented by sequences of turns *manifested* by turn-taking units – dialogical acts – and *manifesting* communicative moods – dialogical intentions/drives/motivations in Consciousness. On the level of Language Gaming, the acts are *Discourse Acts*, giving rise to Discoursal Interactions. A human being is *i.a.* a growing dialectical *Symbol* coextensive with his history of participation in conversations (dialogical semiotic Arguments). The domain of reference of a given human being (*Symbol*) is included in his constructed *Social World*. Together, Interpreter (Subject) and Utterer (Cosubject) constitute a socio-linguistic *we*-group. Cumulatively, the Social World is iconic-reflexive, indexical-instinctual, symbolic-conventional. The Ontologies sedimented in the course of the communicators' interactions with their surroundings constitute a cumulative conceptual-propositional knowledge system, an *encyclopedia*, plus the *Unterwelt* of their individual Language Gaming competence.[29] *Languaging Semiosis* is triangulated into Mimetic Signaling, Sign Playing, and Language Gaming.[30]

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autopoietic Discourse Acts, contracting 'molecular' *sym-poietic* Discourses. Discourse Acts (and thereby Discourse) cohere 'argumentally' in *complementary* sequences, *Nexus*, of Question-Answer, Directive-Obeying/Disobeying, etc. Notice that conversational turn taking (reception-production) has its origin in basic behavioral stimulation-reaction sequences. Both are *practo-poietic*, the latter coming to perform a *sym-practical* function with respect to the former communicative Praxis.

[29] Just as the actant Subject contains a cognitive *Gegenwelt* (Ac/Bc) corresponding to the external *Umwelt*, the interactant Subject/Cosubject harbors a communicative *Unterwelt* (Ad, Bd) corresponding to their social *Überwelt* (Dd).

[30] Language Gaming is a kind of conclusion of the two previous levels. Peirce's three phenomenological-ontological categories lie behind: Firstness & Secondness > Thirdness – a dialectic structure of 'thesis' (Mimetic Signaling), 'antithesis' (Sign Playing), and conclusive 'synthesis' (Language Gaming). In terms of the evolution of *semioticity*, Symbols are the end stage, and herein a cardinal Symbol is a *proper name*.

- III.3 ***Languaging Semiosis***
- III.3.i Mimetic Signaling [reflexive]
- III.3.ii Sign Playing [ethological bodily communication]
- III.3.iii ***Language Gaming*** [conventionality: universal *Human Linguistic Faculty*; specific *Lexico-grammar*]

Language Gaming itself is a macro-system (layer), with *contact*-centered phatic *Communion*, *message*-centered poietic *Practice*, and conclusively, *code*-centered meta-linguistic *Tradition*, concerning the transmission of the cultural-linguistic *conventions* to be normative targets (constraints) in communicative situations. Transmission is a *methodeutic* process in which the Code, or linguistic currency, is negotiated meta-linguistically. This is done by each individual Interlocutor during his whole lifetime, commencing with his acquisition of his mother tongue on the basis of *universal linguistic principles*, activated on the level of Sign Playing when confronted with surrounding linguistic usage. Thus, language acquisition starts with linguistic Key Stimuli of input usage, triggering the operation of Innate Release Response Mechanisms, i.e. acquisitional processes. The universal linguistic principles function as *law* in the Abduction of a hypothesis concerning the norms (*case*) behind the usage that the learner is confronted with (*result*). By practicing, with these hypothesized norms as targets, he deductively tests their validity, and continuously revising his hypothesis, this ends up being provisionally *confirmed* – the norms he considers valid, *current*, in force. This final level is the *inductive* level of *conventionalization*, the erection of an abstract declarative *community* Code. To be applicable in actual use, this communicative Norm is converted into private *procedural* Codes by way of *Idio-poiesis/Hypo-semiosis* (Thomsen 2019). In this way, Language Gaming is perpetually recycled.[31]

Language Gaming is characterized by socio-cultural *conventionality*. Thus, Tradition is triangulated into Code Reconstruction (Abduction), Prediction and Practical Testing of reconstructed Code (Deduction), and (resulting in) Conventionalization of the Code (Induction). What this means is that, within the layer of Language Gaming, there is focus on the system of lingua-cultural transmission from generation to generation (*Tradition*), on language acquisition and change, and, within the latter, on the *conventionalization* of the Code being followed in synchronic Communion and Practice. This layout clearly shows human language – *Total Human Evolutionary Communication* – as an evolutionary phenomenon. On one hand, Language Gaming is *phylogenetic* result of evolution of reflexive and motivational languaging into convention-based *Inter-locution*, and on the other, *ontogenetic* result of Tradition, socio-cultural transmission of conventions.

[31] In fact, the level of Conventionalization of the Community Dialect is *proto-inductive* since we integrate two individual procedural levels (proto-abductive Ad, proto-deductive Bd) into a collective, declarative level (Dd in Social World). This “quantum leap” could be termed *poli-poiesis/hypero-semiosis* (*hypero* for ‘upwards’), paralleled by the reverse *operationalization* that I have termed *idio-poiesis* (*idio* for ‘private person’)/*hypo-semiosis* (*hypo* for ‘downwards’). As above, the duplex terms *X-poiesis/Y-semiosis* owe their terminology to their being combined cybernetic and semiotic.

Linguistic traditions are arbitrary, in the sense that there is glosso-typological variation across the globe – and therefore many diverse mother tongues as variations on the theme of the phylogenetic *Human Language Faculty*.

- III.3.iii *Language Gaming*
- III.3.iii.1 Communion [*Contact*]
- III.3.iii.2 Practice [*Message*]
- III.3.iii.3 *Tradition* [*Code*][32]
- III.3.iii.3.a Hypothesis formation [*Abduction*: Hypothesis of Code]
- III.3.iii.3.b Prediction and practical testing [*Deduction*: Application and testing of hypothesized Code]
- III.3.iii.3.c Conventionalization [*Induction*: Confirmation (or revision) of hypothesized Code]

Language games are intersubjective, reciprocal deontological turn-taking *Nexus* between Interlocutors whose turn taking units are denotationally related to their Social World and have free *compositional discourse structure* and *recursive syntax*. Discourse Practice is integrated with different kinds of bio-cultural *Co-practices* that they may coordinate or even construct. Together they constitute functionally coherent bio-semiotic *forms of living* of communities of practice. Forms of living are instances of *total human evolutionary behavior*. Linguistic discourse and other socio-cultural behavior are creative, free, and thus in principle unpredictable. However, by being also *socio-culturally ruled* and constrained,[33] social coordination and predictability are in principle secured. The *behavior-directing* constraints are normative targets embodied as discourse competences and *habitus* anchored within each communicator but with intersubjective, collective scope. These norms are constructed and reconstructed, negotiated and adapted, to cope with a changing reality (*Life World*). The theory of communication being developed here is *bio-cybersemiotic*.[34] This means that communication is cognitive and communicative, and part of ethology and (social) psychology plus (social) anthropology.

[32] In fact, the two previous levels constitute an *object-level* of Communication, Tradition being a *meta-communicative* level. They co-occur as integrated threads of Communication, securing a connection to the *past* (Communion), the *present* (Practice), and the *conditional future* (Tradition). This kind of circumscribed evolutionary packaging I term *para-poiesis/peri-semiosis*. Notice that *Code* is taken as a shorthand technical term for *communicative competence*, including *lexico-grammatical competence*, thus stressing the ingredients of *social contract* and *conventionality*.

[33] By 'rules' and 'constraints', I mean not only *regulative* rules (regulating already existing behavior) but also *constitutive* rules (creating Language Gaming). Constitutive rules represent an evolutionary innovation with respect to the biological reflex and ethological causality present in Mimetic Signaling and Sign Playing. It seems that *constitutivity* is defining not only for community language but any social institution (Searle 1995, 2009), and that this *sociality* is internalized into the competences of each Interlocutor.

[34] In so far as *Cybersemiotics* recognizes 'autopoiesis' and 'biosemiosis', I venture the term *cybersemiosis* for combined cybernetic and semiotic processes, basically *biological cybersemiosis* (or, *bio-cybersemiosis*) for 'biological autopoiesis' and 'biosemiosis'.

Human communication is a macrosystem with evolutionary *layers* containing triangulations of evolutionary *levels*. Preliminarily, a *propaedeutic* layer contains the levels of Background capacities, Signification Sphere (*Umwelt*), and *Evolutionary Cognition*, which in turn comprises the levels of Consciousness, Memory (Ontology), and *Evolutionary Communication*, in its turn consisting of the levels of Mimetic Signaling, Sign Playing, and *Interlocution – Language Gaming*, evincing the levels of Communion, Practice, and methodeutic *Tradition*, consisting finally of the levels of abductive Competence *Formation*, deductive Competence *Comprobation*, and inductive Competence *Confirmation* (*Conventionalization*). The resulting *declarative* Community Convention is internalized as the *procedural* target of the communicative behavior on the levels of Communion and Practice, thus yielding a cyclically "feeding" process. Preliminarily, outside THECC's boundary, is the input level of the neutral contextual environment *Umgebung*. This is summarized by The Ladder of *THECC*, simultaneously functioning as disposition of the chapter (Table 17.3).[35]

Table 17.3 The Ladder of *Total Human Evolutionary Cognition and Communication*

Environment (Conditions of living: *Umgebung*)	–
Propaedeutic: *Practo-poiesis/Semio-genesis*; *Oiko-cybersemiosis*; *Para-poiesis/ Peri-semiosis*	**5**
Biological Background: *Bio-cybersemiosis;* Endosemiosis; structural coupling	5.1
Signification spheres (*Umwelt*; *Mitwelt*; *Social World/Überwelt*)	5.2
Evolution of *private* mind (*Actant*) – Anapoiesis/Intrasemiosis	5.3
Evolutionary Cognition; *Psycho-cybersemiosis*; eco-semiosis	**6**
Consciousness: Pheno-semiosis	6.1
Memory: *Gegenwelt*; *Spiegelwelt*; *Unterwelt*	6.2
Evolution of *social* mind (*Interactant*) – Cata-poiesis/meta-semiosis; Languaging semiosis	6.3
Evolutionary Communication; *Socio-cybersemiosis*; eco-logical semiosis	**7**
Emotional Signaling; *Symptomatic* signification	7.1
Motivational sign playing; *Instinctual* signification	7.2
Evolution of *rational-reflexive* social mind – Deonto-poiesis/Nomo-semiosis; interlocution	7.3
Language Gaming; *Glosso-semiosis*; *Thinking Logo-Semiosis*; *Conceptual* signification	**8**
Communion – Phatico-semiosis	8.1
Practice – Poietico-semiosis	8.2
Evolution of *Cultural Mind* – Paideia-poiesis/meta-semiosis	8.3
Tradition; *Memetico-semiosis*; *Critico-semiosis*	**9**
Hypothesis formation (abduction, creativity, and innovation)	9.1
Prediction and testing (deduction); meta-cybersemiosis	9.2
Conventionalization (induction); Idio-poiesis/hypo-semiosis; Para-poiesis/Peri-semiosis	9.3

[35] – except for the system-external *Umgebung*, the reality precondition for THECC. These fundamental conditions of living constitute a *terra incognita* as the domain for the overarching cybersemiotic processes, *Para-poiesis/Peri-semiosis*, together forming the *Semiosphere*.

In the following, we shall "descend" the ladder one step per section – including a *landing* where a third level of a phase comes to function as a *layer* (in bold) in the next phase. A conclusion follows (Sect. 10), summarizing the results we have harvested as we went along. I apologize for the crooked path – and the thorny terminology on our way.

17.5 Propaedeutic: Practo-Poiesis/Semio-Genesis; Oiko-Cybersemiosis; Para-Poiesis/Peri-Semiosis

Total Human Evolutionary Cognition and Communication, and focally the final layers of *Language Gaming* and *Tradition*, are dealt with by *Cybersemiotic Discourse Pragmatics*. Some species, especially the human one, evince behavior that is not only 'behavioristic' but is partly based on *cultural tradition*, i.e. the instruction by Models to Learners on how to behave, and the learning of behavior by way of trial and error and legitimate peripheral participation by Learners in communities of practice. The stages leading up to cultural learning (*Paideia-poiesis*) are thus *Pro-paedeutic*.

Propaedeutic then is the layer of the *origin* of perceptual-presentational and communicative-representational-mediational semiosis – *semio-genesis* – in individual biological organisms' interacting with the environment, adapting to it and/or constructing it as a *niche* (Laland et al. 2000). These *Agents* are characterized by inherited contextual *Background Capacities* (internal biological organization), and the *environment* is their *living conditions* (Cc). Fundamentally, they are molecular, metabolic living systems (Maturana 1970, 2002), singular discrete entities operating in a molecular medium. I shall say that they are combined (δ) intaking (α) and outputting (β) systems with respect to their medial domain (γ): (<α/δ/β>, γ). Externally, with respect to the medial surroundings, the organism partakes in *Structural Coupling* (Maturana 2002); internally, it undergoes *endosemiosis* (Uexküll et al. 1993). The mediating process (δ) is pre-cognitive *Biological Autopoiesis* (Maturana and Varela 1972; metabolism, *hyle-poiesis*). In terms of Cybersemiotics' *Four Star Model* (Brier 2008, 2015), this is the lowest layer, concerning bio-chemistry, the first and second arms of the model. Basically, it is a *practo-poietic* system (Nikolić 2015), so what is built up is a *sensory-motor* biocybernetic system, with a central organ, the Central Nervous System (CNS) of perceptual 'organs' (*Merkorgan*) and effectual 'organs' (*Wirkorgan*) integrated as a *contextual Brain* (Nikolić 2010; *Background*). The Brain coordinates (δ) peripheral physiological systems of perceptors and effectors which perceive (α) and operate upon (β) the environment (γ). On this level, we deal with the *physiological* causation between the CNS and the workings (*energeia*) of the Peripheral Nervous System (unconscious *reflex* responses), not the *intentional* (psycho-somatic) causation between Consciousness (Mind) and (the Brain and) the Peripheral Nervous

System (conscious *intentional* action).[36] In the interaction between the Agents and their environment, they create an outward *niche* of it and *represent* it internally. This interaction is accordingly a combined cybernetic (*poietic*) and *semiotic* process that I shall term *oiko-cybersemiosis*. There are three different types: biological *Structural Coupling*, psychological *Ecosemiosis*, and sociological *Eco-logical Semiosis*.[37]

Evolution involves *transitions* from Body/Brain to (individual) Mind, and from there on to Society (collective communicative Mind). The transitions are represented as *interpenetrations* in Brier, here by evolutionary *transmutations*. If we zoom in, we discover that there are three kinds of Mind, viz. *private* Mind in Cognition (individual perception and action, as determined by individual, *I*-intentionality), *social* Mind in Communication (e.g. individual Discourse Acts, as determined by collective, *we*-intentionality), and interpersonal, collective *communicative* Mind (Peirce's *Commind*), in whole societal Discourses (*exo-semiosis*), understood as the *result* of the individual discourse contributions (Table 17.4).

Obviously, these transitional zones are crucial for any *synechistic* evolutionary theory, as is the transition zone – outside our window – from physics/chemistry to biochemistry, on one hand; and, on the other, from ethological Sign Playing to human-specific Language Gaming.[38] Relevant to this Section is the first transmutation: *ana-poiesis*/*intra-semiosis* (*anapoiesis*, Nikolić 2015; *intra-semiosis*, Brier 2008). The second transmutation, from private to *social* Mind, involves the

Table 17.4 The transitional zones and *transmutations* of synechistic, *para-poietic/peri-semiotic* evolution (THECC)

Transition zones	Brain → private mind	→ Social mind (Individual)	→ Commind (Society)	→ Social mind (Individual)
Transmutations	*Ana-poiesis/Intra-semiosis*	*Cata-poiesis/Meta-semiosis*	*Poli-poiesis/ Hypero-semiosis*	*Idio-poiesis/ hypo-semiosis*

[36] Maturana (2002) claims that autopoiesis is solely *molecular* (here: *biological*), ruling out the existence of psychological and social autopoiesis (Luhmann 1995; Brier 2008). I believe that autopoiesis may be the case on all three levels, e.g. in the form of internal biological endosemiosis, internal psychological *pheno-semiosis* (private, closed Consciousness), and internal *languaging* semiosis (*noo-semiosis* > *thinking logo-semiosis*). The *organization* (form) of the Organism is conserved while its '(material) structure' (substance) is continuously regenerated, *hyle-poiesis* (cf. also Imoto 2011).

[37] Uexküll (1909) is perhaps the first to have described this *oiko-cybersemiosis* as a transformative process, when he distinguished between the external objective *Umgebung*, the likewise external subjective *Umwelt*, and the internal representation of the latter, viz. the *Gegenwelt*.

[38] Notice here the four domains of the Cybersemiotic *Four Star Model* (Brier 2008: 131, 361). The evolution of verbal Language Gaming includes the evolution of the kind of illocutionary act termed *Declarative* (Searle 1989), where a social fact is created by performing a speech act. The last two transmutations that are relevant for the total picture is the one developing *metalinguistic tradition* (*paideia-poiesis*), on top of genetic inheritance, and the one developing *conventionalization* inside tradition. *Bodily Mimesis* (Zlatev 2014a, b) seems to be the initial stage of *paideia-poiesis*. If we take Language Gaming as being primarily *Practice*, and if Practice implies *Community of Practice*, then *Paideia-poiesis* is the prerequisite of Language Gaming, and thus (partially) coincides with *Bodily Mimesis*. We then have to explain the evolution of *symbolicity* out of iconicity-indexicality (cf. Zlatev 2014a, b; cf. Vygotsky and Luria 1930; Vygotsky 1978).

evolution of *collective* intentionality from individual intentionality, and *intersubjectivity* from subjectivity (cf. the evolution of social-psychological *Joint Attention-Action*; Tomasello et al. 2005; Gilbert 1990). *Empathy* (*sympathy*; Trevarthen 2002) and social *imitation* (Willer 2009) are fundamental prerequisites of Social Coordination in *Sympoiesis*/*Exo-semiosis*, establishing *Harmony* between Communicators (see Table 17.9 below). The kind of Communication (*Languaging Semiosis*) performed by a given species is determined by the character of their *collective intentionality*, *intersubjectivity*, and the *sharing of attention-action*. This means that Cognition is a prerequisite for Languaging Semiosis, and thus that *Mimetic Signaling* (Cybernetic Languaging through Signals, Brier 2008) also presupposes Consciousness, and thus is above the level of Bio-cybersemiosis/Endosemiosis. *Signaling*, the lowest level of Communication, is based on primary intersubjectivity and collective intentionality. A school of fishes, a migration of birds, and a hive of bees all constitute kinds of *societies* based on *Structural Coupling* and *Mimetic Signaling*.

17.5.1 *Biological* Background *Capacities: Bio-Cybersemiosis; Endo-Semiosis; Structural Coupling*

The cyber-semiotic basis of the model can be gleaned from Fig. 17.1 below. Peripherally, an Organism is a sensory-motor system, with receptors and effectors coordinated by a *Central Nervous System* (centrally, a controlling Brain) with

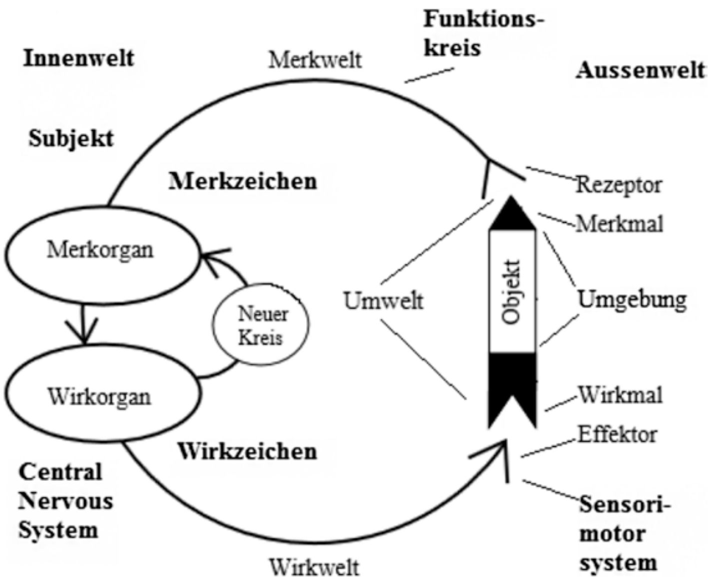

Fig. 17.1 Von Uexküll's (1909) *Cyber-semiotic* model

sensory and motor related parts (*Organs*).[39] As autonomous, self-governing, spontaneous Subject (biological *Agent*), a human being is characterized by irreducible *emotivity*, *conativity* (motive force, will to act, to survive), *intentionality* (perceptive force, correlation with, and directedness towards, surroundings), plus *intelligence* (drive towards understanding), functioning in goal-directed, purposeful behavior (inclinations; *entelechy*). In line with their autonomy, factors of *imagination*, *creativity*, and *spontaneity* characterize self-initiated behavior. The individual organism is an *autopoietic* system interacting with its environment, meaning that it acts on its own determination, however on the basis of perturbations or irritations by this environment (i.e., *triggering* experiences). Only part of the environment is relevant (informative, significant) and functions as its Signification Sphere (*Umwelt*). Notice that the motive force is input to the perceptive force, in that an Organism is not a passive sense receptor but seeks experiences actively (Nikolić 2010; Noë 2004). What is relevant, what *makes a difference*, in the *Umwelt* is determined by sensory-motor capabilities and inherited forms of knowledge (i.e., epistemological universals), categorization capacities, and schematicity, plus emotional and motivational states, applying to the sense *impressions* (=active/activated sensory-motor *Presentamina*) to yield or recall Objects and intentions in the Organism's Mind.

Biological autopoiesis and endosemiosis, within the CNS, trigger the generation of Consciousness and Memory on the next layer, and these *mental* aspects overlay the strictly biological contextual Background processes and capacities. Thus, perception creates impressions (sensations) and senses (interpretations) in Consciousness, and these are stored in long-term Memory, from which they are recalled (re-activated) in perceptual recognition. This generation of Mind is what is covered by the transmutation, *ana-poiesis*/*intra-semiosis*.[40] Fundamentally, the biological contextual *Background* capacities are capacities to *behave*, to act and interact, to undertake *practo-poiesis* (Nikolić 2015). In our context, it is important to

[39] The Background is the biological basis of an Organism in its nerve *organs*: the CNS (Brain) and PNS, composed of nerve *cells* (neurons). An Organism is a Body, composed of organs – the nervous systems plus all the rest. A communicative Organism has a duplex Mind (produced by the CNS): a *private* Mind (*Actant*) and a social Mind (*Interactant*). The *social* Mind part constitutes the Organism as a social atom (*zoon politicon*), separated from other Organisms but interacting with them and yielding *interactional Collectivities* (*social molecules*), *Commind*, functioning in eco-(logical) semiotic systems with respect to their collective Signification Spheres and Life Worlds. The private Mind harbors individual intentionality and subjectivity, the social Mind collective intentionality and intersubjectivity. The Commind (Exosemiosis) consists of three parts, an interobjective (Dc), an intersubjective (D_A, D_B), and the sociocultural norms (Dd). D_A and D_B are *Actors*, the outward, public manifestations of the Interactants (social Minds), A, B.

[40] This means that Cartesian dualism is impossible in this model: our Mind is created from, caused by and realized "in", our Body (Brain). Thus, formulations like "embodied mind" are even a *contradiction in terms* – the Mind is not 'em-bodied' (i.e. 'placed *inside* the body'), it is a "higher order" somatic "outgrowth", a *qualitative* aspect of the Body. Our conception is foreseen by Peirce's cosmology and evolutionary theory (Brier 2017a, 2017b), according to which Mind and Matter are two aspects of the same thing (*hylo-pathism*). Notice that Sensations (impressions/appearances) are (firstness) created by the "senses" (sensory-motor system), and that *Senses* (= interpretations, cf. Germ. *Sinn*) are (thirdness) created by these, i.e. they are "second order" signs.

distinguish between focal *Praxis* and background *Sym-praxis*, where the former could be characterized as semiotic (e.g. dancing), the latter non-semiotic (e.g. moving) – sometimes they are just different aspects of the same behavior, e.g., speaking vs. emitting sounds. Together they represent *forms of living* and constitute a *world of living*, demarcated from the *conditions of living* (*Umgebung*).[41] Importantly, the characteristic feature of Language Gaming, viz. cultural learning and transmission (practicing and rehearsal) – *paideia-poiesis/meta-semiosis* – is also relevant with respect to *Sympraxis*, as in the evolution and acquisition of technology.

17.5.2 Signification Spheres

Due to the interaction between the *Background* Capacities of the organismal Subject and the objective environment (*Umgebung*), a subjective *Signification Sphere* is constructed – von Uexküll's *Umwelt*. How this *eco-semiosis* is conceived may be illustrated as in Fig. 17.1, where *Wirkmale* and *Merkmale* to the right are the crucial features.

The objective *Umgebung* is turned into a subjective, meaningful *Umwelt* whereby some properties (potential signs) come to function as cues (Sign Vehicles: *Merkmale* and *Wirkmale*) to *Merkzeichen* and *Wirkzeichen* inside the individual biological organism – the sensory-motor system correlates the outer cues with the inner impressions. The latter are created by the CNS and are actual and present in Consciousness in perception but virtual and absent, stored in Memory. This sensory-motor behavioral situation constitutes the genesis of semiosis. Thus, the Object functions as dynamical Object in the Signification Sphere (*Umwelt*), determining the impressions in the *Innenwelt*. Perception is interpretive action, whereby an Object is registered as well as assigned a Sense (cf. Meaning). The Sensations (impressive Signs) and their Senses (interpretations) are mental features of the organism's Mind.

The Central Nervous System is characterized as a closed circular neuronal organization that determines sensory-motor correlations and thereby behavior by the organismal Subject with respect to its Signification Sphere (*Umwelt*). This Agent is *structurally coupled* with its environment. The sensory surface *Receptor* and the motor surface *Effector* constitute the *Peripheral* Nervous System. The perceptual *Merkorgan* and the motor *Wirkorgan* constitute complementary parts of the *Central* Nervous System, a structure-determined system with operational closure, a closed network of interacting neurons. The development of the Central Nervous System

[41] The *forms of living*, as the integration of primarily semiotic Praxis with (primarily) non-semiotic Sym-praxis, cover the subject matter of *Distributed* Cognition and Language (cf. Thibault 2008). This *externalist* approach does not recognize a "central processor", as does methodological (Darwinian) individualism, like the present model (cf. Knight et al. 2000).

represents biological autopoiesis, related to *endosemiosis*.[42] Biological autopoiesis concerns the growth of the neuronal network of the Central Nervous System, in terms of connections and complexity. Notice the characterization of the Central Nervous System as a circular system, Uexküll's *neuer Kreis*, involving reafference or *feedback* from the efferent system (*Wirkorgan*) to the afferent system (*Merkorgan*). The human organism is thus characterized as a *bio-cybernetic* system. Likewise, as stressed above, it is a *bio-semiotic* system, where the CNS creates actional and perceptual semiotic structures. A crucial point here is the development, out of the feedback system, of a *Mirror Neuron System*, where the perception of an act triggers the mental imitation (re-enactment) of the very same act by the Perceiver. On the layer of Languaging, this gives rise to the evolution, within the Subject, of a psychological *Eigenwelt* of the Addressee itself and a *Spiegelwelt* of the Addresser, where the Subject's observation of the Addresser's social projection in the *Mitwelt* (Cosubject) may give rise to e.g. emotional contagion (see Sect. 3.1 below).

The Subject (its Body/Peripheral Sensory-Motor System: Agent, C_A) interacts with the Object (C) whereby the former Agent (Actant) comes to *internalize* the latter (C), in the form of sensory-motor impressions, *sensations* (*Merkzeichen* and *Wirkzeichen*) in its Mind, caused by and realized in its Central Nervous System (*Merkorgan* and *Wirkorgan*). In the opposite direction, the Object comes to carry *Sign Vehicles* for the sensations: *Merkmale* and *Wirkmale* – it becomes a combined *Merkmalsträger* and *Wirkmalsträger*. This is the reason for calling the *Umwelt* a *Signification Sphere*, Domain of Signification. The *Umwelt* Object functions as a *stimulus* and the Agent-Subject effects a response in the form of constructing sensory-motor Signs, and deduces reactant behavior accordingly. There is a kind of *congruence* (iconicity) between the external *Umwelt* Object, via its *Sign Vehicles*, and the conscious subject-internal sensory-motor *Signs* (recalling the Generalized semiotic Object in its Memory/*Gegenwelt*), in that the latter Signs are manifested by the former Sign Vehicles. Thereby, the Subject *construes* (the *Umgebung* as) its *Umwelt* (Object). That is: what the Subject Agent perceives (distinguishes) and what it effectuates is determined by its inner structural dynamics (*Background* capacities). A similar view (minus the semiotic aspect) is represented by *Autopoiesis Theory* (Maturana and Varela 1972), cf. Figure 17.2.

The organismal Subject (oval) interacts with its environmental Object (medium, arc). As *Umgebung*, the environment is a potential resource (source of information). As *Umwelt*, the medium contains the dynamical Object. Medium and Subject are structurally coupled (hooks), in a kind of co-adaptation. The contra-clockwise arrow on the oval symbolizes the 'form' of the living organism, the inner part its 'matter' (or, structural dynamics). The Central Nervous System is a neuronal network connecting the sensors and effectors of the Peripheral Nervous System and interacts with them. The Central Nervous System is developed as the coordination

[42] This, again, gives rise to a *psycho-cybersemiosis* and *phenosemiosis*, via *anapoiesis*/*intrasemiosis*. *Phenosemiosis* concerns the *eco-semiotic* interpretation of *sensations*, in terms of *senses* of higher and higher degrees, related to the same subjective *Umwelt*, this giving rise to deeper and deeper, more complex semiotic structures, stored in Memory.

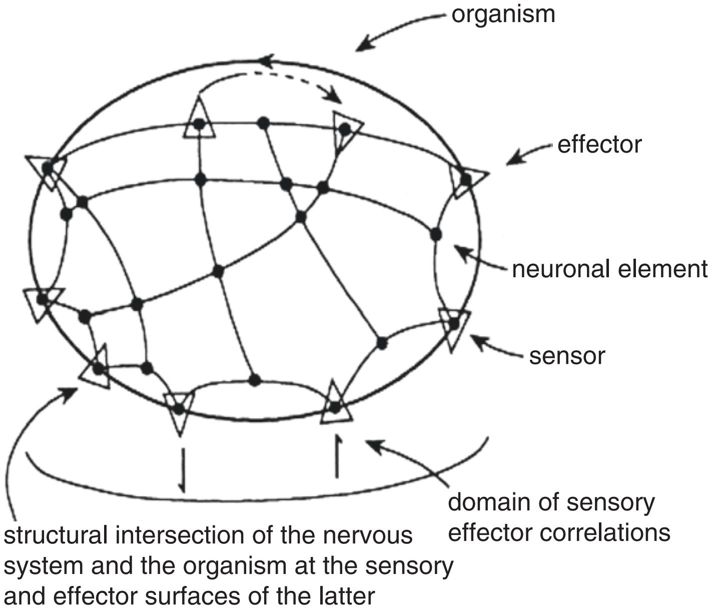

Fig. 17.2 Maturana and Varela's (1972) *Autopoiesis Theory*

of the interactions between the Peripheral Nervous System and the medium. Notice that the model has no semiotic dimension. Therefore, *Cybersemiotics* and *Cybersemiotic Discourse Pragmatics* (Brier 2008; Thomsen and Brier 2014) integrate von Uexküll's crypto Cybersemiotics with Auto-poiesis Theory's cybernetics.

A final ingredient that we need in an explanation of the sensory-motor interaction between an organismal Subject and its surroundings is the logical inference theory proposed in the following sketch by Peirce (Peirce CP 2.711), which clearly involves Consciousness and Memory (Habit, 'law'), plus biological 'reasoning' (proto-deductive syllogisms):

> The cognition of a rule [Law] is not necessarily conscious, but is of the nature of a habit, acquired or congenital. The cognition of a case [Cause] is of the nature of a sensation; that is to say, it is something which comes up into present consciousness. The cognition of a result [Effect] is of the nature of a decision to act in a particular way on a given occasion. In point of fact, a syllogism of Barbara virtually takes place when we irritate the foot of a decapitated frog. The connection between the afferent and efferent nerve, whatever it may be, constitutes a nervous habit, a rule of action [Law], which is the physiological analogue of the major premise. The disturbance of the ganglionic equilibrium, owing to the irritation, is the physiological form of that which, psychologically considered, is a sensation [Cause]; and, logically considered, is the occurrence of a case. The explosion through the efferent nerve is the physiological form of that which psychologically is a volition [decision] [Effect], and logically the inference [deduction] of a result. When we pass from the lowest to the highest forms of innervation, the physiologically equivalents escape our observation; but, psychologically, we still have, first, habit [Law] – which in its highest form is understanding, and which corresponds to the major premise of Barbara; we have, second, feeling [sensation] [Cause] or present consciousness, corresponding to the minor premise of

> Barbara; and we have, third, volition [decision] [Effect], corresponding to the conclusion of the same mode of syllogism. (Peirce CP 2.711; cit. in Brier 2017a)[43]

Evidently, this model is apt for our purpose since it distinguishes biological, psychological, and sympoietic layers.

17.5.3 Evolution of Private *Mind (*Actant*) – Anapoiesis/ Intrasemiosis*

The *private Mind* of the psychological level has evolved from biology via the transmutation *anapoiesis/intrasemiosis*. The Mind is created by the CNS (Nikolić 2015) and is primarily either *actual* Consciousness or virtual, *would-be* Consciousness (resource) – *Memory*. What triggers the creation of the private, presentational Mind is the sensory-motor confrontation and interaction with the surrounding external, objective world, *Umgebung*. The Organism, with its phenomenological Consciousness, *and* its experiential medium are *structurally coupled* and both undergo structural changes (assimilation and co-adaptation) as a result of this interaction. In this interaction, the subjective *Signification Sphere* (*Umwelt*) and its internal presentation, *pheno-semiosis*, co-emerge. The *Umwelt* is an inhabitable cognitive *niche* for the Actant and is internalized as a cognitive map (*Gegenwelt*, in Memory) for it to manage its cognitive, sensori-motor behavior. Its perception is *proto-abduction*, its action or operative behavior is *proto-deduction*, and via *proto-induction* the Memory is created as a behavioral habit.[44] The cybersemiosis contracted by the Organism and an external, *dynamical* Object in its *Umwelt* is *eco-semiosis*, and together Organism and *Umwelt* constitute a second-order, *ecological* unit – an *Eco-semiotic System*. This is a unit of biological selection (cf. the co-evolution of colors and color perception-(re-)action).[45]

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[43] Another triangulation would have the sensory-motor system as a triadic system with a central ‘knot’: A. the sensory part; B. the motor part; C. the Cognition part (understanding, knowing; *Consciousness*); D. Habit (law, *Memory*). The creation of Consciousness and Memory is *ana-poiesis* (Nikolić 2015).

[44] *Proto-inference* (in the Biological Background) is the natural basis of cultural, *normative dialectical* inference (cf. Thomsen 2019).

[45] Objects are *prototypically* concrete, first-order natural, basic-level objects of perception-operation (i.e., ‘thing’, *concretum*), functioning as *source* of *Merkmale* (‘she smelled (*the scent of*) the flower’) and operated upon, acquiring effector cues, *Wirkmale*; but also natural, second-order actions and activities (eating or fleeing) may be the presentational Objects of perception-action. *Allo-poietically*, Objects may be *created* Objects, either *instruments* for practical use (technology) or *communicative* instruments for esthetic experience, like a sculpture or a painting (art) – however, here we are already on the bodily mimetic level of *Paideia*-poiesis. *Social Facts*, e.g. (parts of) communicative encounters, like a Discourse Act of saluting, may also be the Object of perception, however, immediately turning into Objects of communicative Reception (*Communicative* Objects). Whether third-order (logico-psychological) entities like *judgments/propositions* and *inferences* may be seen as (internal) Objects depends on one’s conception of *introspection*.

17.6 Evolutionary Cognition: Psycho-Cybersemiosis; *Eco-semiosis*

The private Mind is basically characterized by subjectivity and individual, *I*-intentionality (individual psychology). From here, intersubjectivity and collective, *we*-intentionality (*Interactant*), plus *joint attention-action*, are developed via the transmutation *cata-poiesis/meta-semiosis* as prerequisite of Communication. Whereas *eco-semiosis*, coupled to individual psycho-cybersemiosis, has the *Umwelt* Signification Sphere as its denotative domain, socio-psychological *cata-poiesis/meta-semiosis* creates a communicating, social Mind (A), *Interactant*, which, via *eco-logical semiosis*, additionally involves a social *Mitwelt* (B) and a *Social* Signification Sphere (*Überwelt*, Dc) as its domains of address (cf. Bergman 2010 on Peircean collateral experience and interpretation).

17.6.1 Consciousness – Pheno-Semiosis

In *I*-consciousness, I am intentionally directed at a *Real* Object (I-intentionality). It is *present* to me (as an appearance, impression, and is hermeneutically attributed a *sense*). In *we*-consciousness (with we-intentionality), I am intentionally directed at my *Mitwelt* Co-subject (*you*), at the *Reference Object* (*it*), and at our collective *We* in the *Social World*. I am also conscious of *myself* (*self-reflection*). The social *we*-intentionality is 'owned by' the individuals *singularly* (not by a collective consciousness/*macro-mind*; cf. Searle 1990, 1995, 2010; Krippendorff 1996; cf. Gilbert 1990; Tomasello and Carpenter 2007).[46] Collective intentionality constitutes the basis of Communication, of basic Languaging as well as Language Gaming, with its principle of cooperation and Conventionalization (collective acceptance, agreement). *Cata-poiesis* connects bio-psychological *auto*-poieses of individual Actants with sociological *sym-poiesis* (reciprocal coordination; Dempster 2000) of dyads (polyads) of Interactants, in the creation of *joint action* and *interaction*. What is created on the communicative level is not a societal, autopoietic macro-mind (*ana-poietic* result of a collective super-brain) but a *communicative Com-mind* – a *sym-poietic* abstractive result (D) of interacting social *Minds* (*Interactants* A, B). From the above, it is evident that the Central Nervous System (Background) produces Consciousness, i.e. sensory-motor *sensations* (*Merkzeichen* and *Wirkzeichen*, images, icons). However, we not only register or *reflect* (bring forth) our surroundings and construct corresponding Signification Spheres, we also *interpret* (try to understand) what we see or do, *ascribing Senses* to sensory-motor Sensations.

[46] Different kinds of social collectivity have proven fit in terms of evolutionary selection. Clearly, Joint Attention-Action are basic, as are the principles of Representation (constructing a socially predictable and navigable world) and Mediation (providing a system of communicative forces, to function *in tandem* with the natural psychological drives and forces).

These experiences, *phenosemioses*, are stored (perhaps re-interpreted) and may be recalled actively or arise spontaneously from Memory (*Gegenwelt*).

17.6.2 Memory: Gegenwelt

Consciousness is connected to a permanent sensory-motor storage component, *Long-term Memory*. Here, information is stored and from here it is retrieved (recalled). Instead of *Ontology* (a metaphysics/artificial intelligence term), we could also label it *Epistemology*, stressing that it is a *model* (knowledge system, *Gegenwelt*) and not the depicted, real-world object itself. The *Sensations* (*Merkzeichen* and *Wirkzeichen*), in Consciousness, which are sensory-motorically related to the perceived and manipulated Object in the *Umwelt*, trigger ideational *Senses*. As mentioned above, there is no *actual* Object *inside* Consciousness (being *presentational*). The *Umwelt* Object is the *actual* correspondent (*token*) of a *virtual* Object (category, *type*) in Memory. Likewise, Sensations and their Senses in Consciousness recall virtual *Presentamina* and *Interpretants* in Long-term Memory. Consciousness and Memory are integrated as the Subject's *Mind*, understood as the general actional category of *energeia*: the triad of the actual *Umwelt* Object (as bearer of the Sign Vehicles) and its internal presentation as an impression (*Sensation*) as well as its actual interpretation as *Sense* constitutes an *actual occurrence* of energeia, *entelechy* (*eco-semiosis*). The *habit* consisting of Presentamen, virtual Object, and Interpretant constitute the Memory capacity, or *dynamis*. Thus, perceiving as *recognition* is actualization of the internal Memory. When novelty is perceived, novel categorization is involved (a form of induction). The term *Ontology* may be reserved for the virtual Object, *Epistemology* for the Interpretant of Long-term Memory, as in Table 17.5 and 17.6.[47]

Table 17.5 Peirce's tristratal model of Body (Physiology), Private Mind, and *Dialectics* x the parts of a generalized deduction ("Barbara")

[Reasoning – Deduction]	Case/cause (Antecedent)	Law/habit (Rule of reasoning)	Result/effect (Consequent)
Body (physiology)	Disturbance (afferent nerve, α)	Nervous habit (rule of action, δ)	Explosion (efferent nerve, β)
Private mind	Sensation/feeling (present consciousness)	Habit/understanding	Volition (decision to act)
Dialectics	Minor premise (occurrence of case)	Major premise of deduction	Conclusion (inference of result)

[47] Thus, the *Gegenwelt* is a Network of labeled *propositional knowledge* (encyclopedia), in the sense that the General Object is *propositional subject*, the stored interpretant its *propositional predicate*. Notice that this knowledge is a *habit* and thus 'symbolic'. Similarly, on the Languaging level, factors of the social *Mitwelt* and *Social World* (*Überwelt*) are represented within the Communicator as psychological *Spiegelwelt* and *Unterwelt*, respectively.

Table 17.6 *Iconic Memory* as a habit between Sensory-Motor Storage (*Presentamina*), *Ontology* (*type* Objects), and *Epistemology* (Interpretants)

	Iconic Memory (*Gegenwelt*)	
Sensory-motor storage	Ontology	Epistemology
Presentamina (< *Sensations*)	*Type* objects (categories < Umwelt objects)	Interpretants (concepts < *Senses*)

Table 17.7 The cross-tabulation external–internal x third-personal (Cognition) – first-/second-personal vs. first person plural (*Sympoiesis*/*Exo-semiosis*)

	Third-personal (*Cognition*)	First-/second-personal (*Communication*)	First person plural (Communicative *We*)
Aussenwelt	*Umwelt* (object)	*Mitwelt* (subject – Cosubject)	*Social World* (*Überwelt*)
Innenwelt	*Gegenwelt*	*Eigenwelt* (*ego*) – *Spiegelwelt* (*alter*)	*Unterwelt*

In Communication, the Objects of Representation are external *Reference Objects* (Dc) coupled with immediate Objects in Communicative Consciousness (Ac, Bc), and the Interactants (Subject and Co-subject) are internally mirrored, as in Table 17.7.

17.6.3 Evolution of **social** *Mind (***Interactant***) – Cata-Poiesis/ Meta-Semiosis; Languaging Semiosis*

As mentioned above, the communicative layer evolves out of the cognitive layer via *cata-poiesis*/*meta-semiosis* (collective intentionality, intersubjectivity). The Subject's (A) involvement with a *Mitwelt* Cosubject (B) in addition to a *Social World* Object (Dc) is a prerequisite. Whereas individual Cognition is defined by eco-semiosis relating the Subject with its *Umwelt* (Cd) and constructing an *Eco-semiotic System* out of the two, *collective* Cognition and Communication are triadic in that the context of a Co-cognizer/Co-communicator (B) is added. The semiosis here is *Languaging Semiosis*, and an *Eco-logical* System is constructed, containing both Subject (A), Co-subject (B) and Object (Context, Dc), related by *collateral* Cognition and Communication. Since Subject is common to both Cognition and Communication, in the function of Perceiver and Receiver (A), it is considered a pivot of the model. The function of Originator (B) is the "ergative" innovation of Languaging Semiosis, but also the separation between Organism and the functional roles of Subject resp. Cosubject is new, yielding the *reciprocity* necessary for communicative turn-taking. The Central Nervous System has evolved a *Mirror Neuron System* (MNS) as basis for this. When we co-perceive and communicate, we not only relate to the other (*alter ego*), we also perceive and understand ourselves (*ego*) – we are part of our *Mitwelt*. Just as the *Umwelt* is mirrored inside the Subject (and Cosubject) as a *Gegenwelt*, the *Mitwelt* is similarly mirrored inside both the Subject and the

Cosubject in the form of an *Eigenwelt* (private world, for the *ego*) and a *Spiegelwelt* (mirror world, for the *you*, or *alter ego*). The reason is that you cannot know what the other meant by his contribution, except for what you would have meant yourself if you were in his shoes, making the same or a similar contribution. So, *Spiegelwelt* is just as well a mirror of yourself "as another". Of course, this is seen from the *hermeneutic* viewpoint of the *ego* as Perceiver and Receiver (A). Switching the perspective, when making an utterance (B), you perceive and receive yourself, and in this *hypocritic* constellation, you cannot know what the other perceives and receives (which reading he gives your Utterance), only what you yourself perceives and receives as your own *alter ego*, in feedback. So, while the cognitive Mind is created by the CNS by way of *anapoiesis/intrasemiosis*, the social Mind is created by the CNS/MNS by way of *cata-poiesis/meta-semiosis*.[48] The implication by the latter is a functional reordering (*cata-*) and a *reflexive*, *meta*-stance towards oneself as a communicator (self-consciousness). Whereas the *Gegenwelt* means a model of the world (*Umwelt*), the *Spiegelwelt* and *Eigenwelt* concern a 'theory' of (other) Minds, and *empathy*. The general model of Cognition and Communication is as in Fig. 17.3.

Total Human Evolutionary Cognition and Communication relates a cognitive-communicative Subject (A) with a ditto Cosubject (B) and both with a cognitive and communicative Context (Cd, Dc). The Cosubject belongs with the *Mitwelt*, the *Real* Object with the *Umwelt* (Cd; in a relation of *Eco-semiosis*). The Subject (A) and the Cosubject (B) are both coupled with the *Reference* Object (Dc) in the *Social World*, in a relation of *Eco-logical Semiosis*. The Subject and Cosubject are biologically

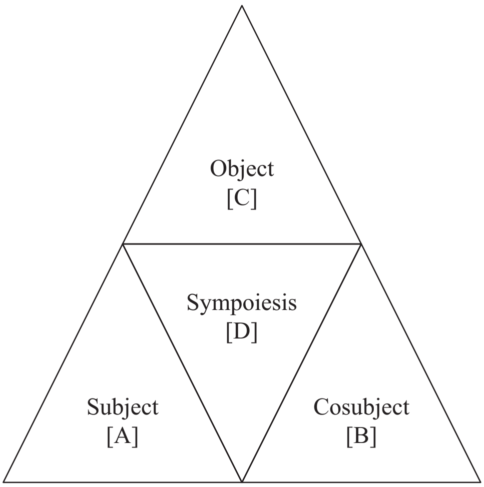

Fig. 17.3 *Total Human Evolutionary Cognition and Communication* (whole triangle) with the triad (A, B, C) and *Sympoietic Communication* (D)

[48] Notice that we distinguish between the transmutation from a private, cognitive Mind (*Actant*) to a social Mind (*Interactant*), and from there to a collective, communicative Mind (*Commind*). The former transmutation is *cata-poiesis/meta-semiosis*, the latter *poli-poiesis/hypero-semiosis*. The 'backformation' from the latter is the crucial *idio-poiesis/hypo-semiosis*. My apologies for the innovative terminology.

(Agent), psychologically (Actant), and communicatively (Interactant) *autopoietic*, and they co-perform/co-produce collective *Dialogical Exo-semiosis* (D), which is thus *sym-poietic*, not self-creating and self-regulating. D is the *result* of the interaction of the individual Interactants (A, B) with respect to their cognitive Context (C) – a compromise between A (Da) and B (Db), and C (Dc). The *Mitwelt* (and *Social World*) is (are) internalized as subjective *Eigenwelt* (*ego*) and co-subjective *Spiegelwelt* (*alter ego*).

Total Human Evolutionary Cognition and Communication is centered on the axis of the Interactants (A–B), which relates to the complementary Contexts of the cognitive world (C) and the communicative world (D). The triad of Subject (A), Cosubject (B), and Object (Context, C) constitute the angles of the total triangle, around the pivotal central triangle D (*Intersubject*). D is the *Nexus* (*Sym-poiesis*/*Exo-semiosis*), connecting the three basic functions; D constitutes a *We*-group (community of Interactors, *Polis*), integrating the positions of *I* and *you* (> Intersubject), with respect to the Context *it*.

Zooming in on Subject A, Cosubject B, *Real* Object Context C, and *Dialoguing* D, each are triangulated as in Fig. 17.4 (below). Starting with the Object pole C, part of it is objective *Umgebung* Cc. Ca and Cb are the *Umwelt* of A and B, respectively, whereas Cd is *Collective Signification Sphere*.[49] Each cognizer-communicator has his individual Background and Cognitive Capacities plus Communicative Competences, responsible for their Cognition and Communication. This is *Ad* and *Bd* (*d* for internal *dynamis* – *dialect*). The nuclear triangle D represents

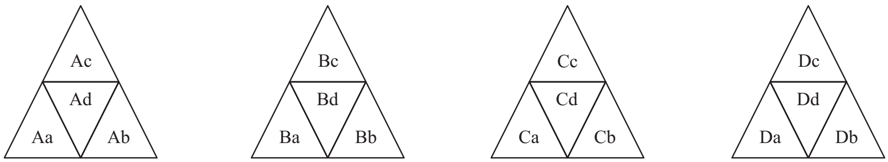

Fig. 17.4 The four parts of *Total Human Evolutionary Cognition and Communication*

[49] This diagram is very useful but also deceptive. Thus, Ac and Bc might represent the *Gegenwelt* of C inside the communicators, whereas Ab and Ba may be used to represent the *Eigenwelt* of each communicator inside the other. However, the *Gegenwelt* was said to be (a part of) Memory, which is Ad and Bd, respectively. Thus, *Gegenwelt* should be Adc and Bdc. The appropriate use of the triangulation modeling would be that A is the *Addressee*, and Aa is *what* he interprets, namely a semiotic *Expression* (cf. *Merkzeichen*) in his consciousness, whereas B is the *Addresser* and Bb is *what* he *utters/gives expression*, namely his *intentional* Meaning. Therefore, Ab is the Addressee's abduced *effectual* Meaning. Ba the Addresser's expression intention (cf. *Wirkzeichen*). Ac and Bc would then be individual *intentionality* of A's/B's perceptual Consciousness (*), their directedness towards their subjective Context (Ca and Cb). Ac and Bc *additionally* constitute the *immediate* Object (**o**) of communicative Consciousness, directed at Dc. Notice that Cc is the *material medium* (*Umgebung*) that interagents relate to in biological *Structural Coupling*, to become relevant *Umwelt* (Cd).

sym-poiesis/*exo-semiosis*,[50] resultant of the synergy of the interactant individual autopoieses targeting individual procedural dialects, Ad and Bd, *tokens* projecting a virtual community *langue* (Dd). The we-group of the *Actors* D_A and D_B constitutes a speech community (*Intersubject*), *public* externalizations of the *Interactants* Ab, Ba. The collective communicative denotation *Reference Object* (Dc) is the *Interobject*, correlated with the *Signification Sphere* of *joint attention-action* (Cd). The community norms Dd and the shared *Reference* Object Dc only exist insofar as they are tokenized (internalized) as the *idiolects* Ad and Bd as well as the individual intentionalities Ac and Bc, respectively.

According to Luhmann's Socio-cybernetics and Brier's Cybersemiotics, the communicative system *D* is *sociologically auto-poietic*, paralleling the biological and psychological autopoieses of the individual. Thus, these models are *holist*, taking the organizational level (*society*, *polis*) to be an autonomous, self-governing entity. Likewise, the Organism is *biologically* autopoietic. Now, in the original theory of *autopoiesis* (Maturana and Varela 1972), knowledge is a result of this creative process, rather than a system of its own, whereby psychological autopoiesis seems to be ruled out, consciousness being reduced to neuronal processes. If, however, Consciousness is one of a kind, we have to recognize a second level of *psychological* autopoiesis, on top of the biological one. And the three levels are disjoint, each demarcated against the other. The models open up for a loop hole, in the form of *interpenetrations*. It is here that Cybersemiotics aligns its levels of semioses, in addition to the rock bottom 'Cybernetic languaging through signals' *Signaling*, and the uppermost 'Socio-communicative Autopoietic Language Games' *Language Gaming* (Table 17.8).

Not so in my proposal: A cognizing and communicating Organism is biological *and* psychological *and* sociological (*zoon politikon* 'societal animal') *in tandem*, constituting a layered, *synechistic* evolutionary structure. This implies that human communication is basically and literally *bodily communication*. All the senses are involved as perceptors – multimodality – and the *whole body* as articulator, *in toto* a sensory-motor communicative system. On an *allo-poietic* level, according to the

Table 17.8 *Cybersemiotics'* (Brier 2008) distinction between *autopoiesis*, *internal semiosis*, *exo-semiosis*, and *eco-semiosis* (Signification), respectively

[Sociological Autopoiesis]	Internal Semiosis	Exo-semiosis	Eco-semiosis
	Thinking semiosis	**Language gaming**	Conceptual signification
Psychological Autopoiesis	Pheno-semiosis		
	Intra-semiosis	Sign playing	Instinctual signification
Biological Autopoiesis	Endo-semiosis	Signaling	Reflexive signification

[50] Letting D be *autonomous*, representing sociological *auto-poiesis* (as in Luhmann 1995; Brier 2008), entails inert "interactants", puppets without *conatus*. In THECC, A and B are conceived of as *individual* social *autopoieses*, on the level of Language Gaming: individual *Discourse Acts* (producing vs. receiving). D is the *collective* Discourse (plus community/declarative Dialect, Dd), a sympoietic *construct*, thus abstract, ideal.

cultural evolution of technology, the bodily articulator and perceptors may be extended by *allo-poietic* artificial articulators/perceptors, whereby the expression possibilities are enlarged by *prosthetic* semiotic displays, e.g. writing and 'computer mediated communication', in for instance 'social media'.[51]

My model being *methodologically individualist* (List and Spiekermann 2013), communicators and their *Consciousness* are the prerequisites for all three levels of Communication (*Exosemiosis*). Whereas individual psychology (subjectivity and *I*-intentionality) determines intra-subjective Cognition (perception, incl. phenosemiosis), social psychology (intersubjectivity, *we*-intentionality) caters for intersubjective Joint Attention-Action and Communication. So, even the lowest level of *Signaling* (Cybernetic Languaging through Signals) requires a Mind, not necessarily a *human* Mind, of course. The medial level of instinctual/ethological Sign Playing is also found with humans. Finally, the upper level of *Interlocution* is found with *any* kind of communication that requires *cultural transmission* in addition to genetic inheritance, that is, not solely *human* verbal linguistic discourse (e.g. avian dialects). In my model, the 'updating' of Memory (incl. communicative competence) and Consciousness belong with the successive stages of Evolutionary Communication. Each successive level of Evolutionary Communication (D) represents, not sociological *auto*poiesis but *sym*poiesis (the collective creation of Discourse, *dialogical exosemiosis*). Further, Evolutionary Communication (*ecological semiosis*) automatically constructs a tri-stratal Signification Sphere: Reflexive, Instinctual, Conceptual. By being *individualist* and *organicist*, my model is built on the *Individual* Signification Spheres (Ca, Cb), as determined by singular sensory-motor acts, and takes the *Collective* Signification Sphere (Cd) as responding to *Joint Attention-Action*. This evolves into the collective successive, incremental built-up of a public *Universe of Languaging* (Dc, topmost: *Universe of Discourse*). Consequently, the communicative interactants (A, B) and their *dialectical* Context (Signification Sphere, Dc) constitute an *Eco-logical System*, and the Communicators being basically individual *eco-semiotic* Cognizers, *Eco-semiotic Systems* are included.[52]

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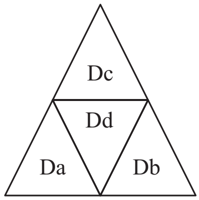
[51] Notice that even written dictionaries, encyclopedias, and grammars/books of stylistics, etc. are allopoietic extensions – sometimes even functioning as norms for the speech community (e.g. official orthographical dictionaries). They are texts (*ergon*), which record or register indicative (descriptive) or directive (normative) discourse.

[52] Science, being a kind of observation (Cognition) and Communication, has its Eco-semiotic System (Cd) and Eco-logical System (Dc) as part of the general systems. (Science crucially involves the level of cultural *tradition* of Language Gaming.) Science is the ever-present corrective to the normal lay systems. The common foundation is the objective 'conditions of living', the environmental *Umgebung* (Cc). Notice that my THECC model has corresponding parts of science: Background corresponds to Peirce's Mathematics, *Umwelt* to concrete, observational (*idioscopic*) sciences (physics, etc.), Consciousness to Phenomenology, Memory to Metaphysics, Emotional Semiosis to Aesthetics, Sign Playing to Ethics, Language Gaming to Normative Logic, Communion to Syntax, Practice to Critical Logic, and Tradition to Methodeutic (explanatory Abduction, Deduction, and Induction). For a detailed exposition and the rationale behind the (more or less) 1–1 correlations, see Thomsen (2019).

Fig. 17.5 The central triangle (D) of the basic model (Fig. 17.3) turned "down-side up"



We are now in a position to plot two current theories of Cognition and Communication, namely Luhmannian Socio-cybernetics (including some "collectivist" conceptions of Peirce's), taken up by Cybersemiotics (Brier 2008), and *Distributed Cognition and Communication*. Here, we shall focus on the D-center of the Communicative Triangle (Fig. 17.5):

Insofar as the triangles A, B, and C represent the basic parts of my triangular model, this leaves a "hole" in the middle, corresponding to the trifurcating center of a "twofork" (inverted Y: ⅄). Let this represent the *Origo* ("alpha") or endpoint ("omega") of the model connecting the three semiotic relata A, B, and C. A and B are 'individual', D is 'public'. D is Peirce's *Communicative Mind*, Da *Communicative Representamen* (from Ba), Db *Communicative Interpretant* (from Ab), Dc *Reference Object* (cf. Cd). Dd would be de Saussure's *langue*, or *community norms*. D would also be a *speech community* (*we*-group: D_A, D_B). In Luhmann's model, D would be *Communicative Autopoiesis*, Da *Utterance Selection*, Db *Meaning Selection*, and Dc *Information Selection*; A, B, and C D's "stimulating" contexts. In *externalist* Distributed Cognition and Communication Models, D would be distributed Cognition and Communication. A, B, and C (physical context) the realizational domains of distribution. The above discussion may be summarized by The Ladder of the Living (cf. Buchanan 2008: 26 ff.; Brier 2009), see Table 17.9.

In *Cybersemiotic Discourse Pragmatics*, Dd represents the negotiated *agreements* between A (Ad) and B (Bd), with respect to C (Cd). A and B are individual, subjective domains, while D is a public, intersubjective domain, C an objective domain. Thus, Ad and Bd are *idiolects*. However, they are turned *socially valid*, thus *dialects*, due to the negotiated *modal* Dd (received community norms) which is fed back into Ad and Bd (via the feedback-loop transmutation, *Idio-poiesis*/*Hypo-semiosis*). Since *Cybersemiotic Discourse Pragmatics* is *individualist* organism-centered, organicist, the organismal Subject (behavioral *Agent*) is the *basic level* category of the hierarchy of biological ontology, implying that an organism Subject/Cosubject can be *decomposed* into organs and cells, and can co-create, with other organisms, an 'organization' (D) which occurs in a wider ecological context (Cc).

Recalling that Brier and Luhmann have the Social System as a monolith, with *Communication* as sociological *auto*-poiesis, a distinction may be drawn between *actually* occurring communication (*entelechy*) in *interactional* systems (Da–Db–Dc), *would-be* communication (*dynamis*) in *societal* systems (Dd), *allopoietic* storage of *past* communications (*ergon*). Dd is *culture* – *cultural norms* and *ideologies*.

Communicators, on the basic level, perform *communicative actions* (3. A-B) in *contrapuntal* reaction to each other, constituting communicative *interactions* (4. D).

Table 17.9 The Ladder of the Living, according to von Uexküll. Excluded: the *Umgebung* (Cc); the individual *Umwelt* (Ca, Cb); the joint attentional-actional Cognitive Domain (Cd); and the public, collective-cultural Communicative Domain (Dc)

Ladder of the Living	Description and exemplification
1. Chime / rhythm of *cells*[a]	The threshold between inorganic and organic nature. A *rhythm* of cells makes up an organ
2. Melody of *organs*[b]	The inalienable members of organisms. A *melody* of organs makes up the unity of an organism
3. Symphony of the individual *organism*	The organism is the basic level: An autonomous self-governed, autopoietic subject [A, B][c]
4. Harmony[d] of *organisms*	Contrapuntal duet *between* two organisms > multi-organismal society [D]
5. Composition of *nature*	The eco- and eco-logical systems projected and adding up to the bio-semiosphere

[a]One cell 'chimes', two or more cells together perform a 'rhythm'. Notice that Maturana and Varela's (1972) original model of autopoiesis (self-creation, autonomy, closure) was a model of the cell, as the "minimal projection" of autopoiesis. It is a minimal system with an *Umgebung*, its medium, with which *structural coupling* occurs. *Structure* here means 'matter', whereas *organizational closure* means 'form' identity. The surroundings *perturb* the system which reacts with internal *compensations* – and vice versa
[b]Nikolić (2010, 2015) describes the *practopoietic* hierarchy within the CNS, from neuronal *plasticity* to neuronal *anatomy*, stressing that *praxis* is the underlying process and that each level is adaptive – that adaptivity and context are fundamental in nature (as in cultural Language Gaming, Verscheueren 2008).
[c]An organism is a dynamically evolving system (ontogenesis: birth, epigenesis: maturation, aging, death), and this is important in relation to the development of cultural tradition since, after birth (with the genetic blueprint for the Background capacities), there may be a critical period in which cultural norms may be acquired/learned, developing Background and Mind. *Communities of practice* are important evolutionary innovations with *legitimate peripheral participation* by the novices (e.g. language learners participating in Language Gaming even though they are not competent speakers of their language yet). The organism is the "maximal projection" of autopoiesis, according to Maturana and Varela, and if *sociological autopoiesis* is reduced to *individual turns/moves* (A, B), not covering the total dialogue (D), as in Luhmann (1995) and Brier (2008), it would be *monotonic*: Individual: A/B = {biological{psychological{sociological}}}.
[d]I would prefer the term *harmony* for the integration of the melodies of the Organisms, letting *symphony* stand for the evolving "music" performed by these organisms in collective cooperation, to obtain a shared goal. The interactions between the Organisms are *Languaging*. In another conceptualization, one could say that the whole Body/Organism/Individual/Person represents a *Symphony* of the interplay of organs, and that there is a central controller, *Central Processing Unit*, CNS (and MNS)/Mind, that "orchestrates" behavior.

The interactants possess communicative, procedural competences for performing as both Receivers (Ad) and Producers (Bd). Biological *auto*-poiesis covers 1.-3., sociological *sym*poiesis defines 4.[53] The *sym*-poietic conception could be depicted as in the following Figure (adapted from Imoto 2011) (Fig. 17.6).

[53] Here, of course, Brier and Luhmann have the Social System as a monolith, with *Communication* as sociological *auto*-poiesis. A distinction could be drawn between *actually* occurring communication (*entelechy*) in *interactional* systems (Da–Db–Dc), *would-be* communication (*dynamis*) in

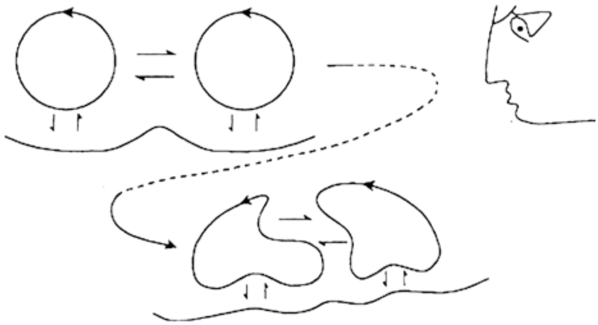


Fig. 17.6 *Languaging* in a second-order viewing arrangement

The Object level of languaging is Observed by a community of Observers, and this may influence the languaging system: it becomes an *Umwelt* for the Observers and is represented inside them in the form of theories (cf. *Gegenwelt*). Notice that the wavy line beneath the Observed communicators (the two circles/plasmas) represents their *Umgebung* (Cc, objective environment) with which they interact (vertical arrows) and thereby construe as an *Umwelt*. Likewise, they react with respect to each other as a *Mitwelt* (horizontal arrows), and co-adapt to each other (cf. *mimesis*). Notice that not only the communicative system itself may be influenced by being observed, the Observing system may also be influenced by observing, e.g. *realizing* facts about communication, previously unknown.[54]

The Subject and Cosubject adapt and accommodate to each other (turning from circles into organic, dovetailing forms), just as they co-adapt to the common *Umgebung* (the wavy line beneath them). The model is second-order cybernetic, involving an observational situation (e.g. scientific investigation by the Observer to the right). Nevertheless, the object-level Interactants (Communicators), in themselves, are also (first-order) Observers, observing each other and themselves as well as the interactions they produce with each other. Thereby, they are *self-conscious*. Notice, too, that they internalize their dialoguing so that they may perform *internal dialogue*, *Noo-semiosis*, with themselves (cf. dialogical verbal *thinking semiosis*, Brier 2008: 399ff.). This shows that there is a *meta-level* sociological *autopoiesis*,

societal systems (Dd), *allopoietic* storage of *past* communications (*ergon*). Dd is *culture – cultural norms* and *ideologies*.

[54] Notice that the Observing system may be part of the Observed system (second-order cybernetics). A telling example is the relation between for instance a language academy and a speech community: the language academy may instruct language users on how to behave linguistically, i.e. impose community norms on them, but the influence may go in the opposite direction, as when the academy changes its norms for the community according to inductive observations of the actually occurring linguistic behavior of the speech community. There is thus both an epistemic-indicative (descriptive) *norms-to-behavior* as well as a deontic-directive (prescriptive) *behavior-to-norms* direction of fit.

the *internal dialoguing* between the *ego* and *alter*, as different stages of the self.[55] However, the sociological kind of *internal auto*-poiesis/*noo-semiosis* presupposes *external* sociological *sym*-poiesis/*dialogical* exo-semiosis.

Returning to level 4. of communicative *Harmony* between the Organisms in Communication and the distinction between sociological auto- vs. sym-poiesis and methodological individualism, we shall argue that there is a compromise, accepting both the methodological *individualism* of Maturana/Uexküll and the collective *holism* of Brier/Luhmann.[56] In the first group, the behavioral agents A, B are in focus, and their interactions D are *sym-poietically created*, whereas in the second group the behavioral agents are *outside* the *focal* social system, since communication is autonomous, *autopoietic* (self-creating). In the latter, autopoietic case, the Communicators constitute the *perturbing* context fueling compensatory changes in the *holistic* Communication System. The compromise is the recognition of *second-order social* autopoiesis whereby social agents, as part of the *structure* of Communication (Schatten and Bača 2010), *perform* its *organization* D. Thus, they are *inside* communication *THECC* and still *liable* communicators. Communication is *participation*: the application of *participants* A, B to *participatum* D (Luhmann/Brier sociological autopoiesis). *Participatum* (D) does not constitute the totality, only its 'pivot', whereby it cannot reproduce itself but needs *Interactants* A, B to perform this crucial function. The Communicators A, B are figure, the *Communicatum* D, *ground*, together constituting the *holistic* communicational *Gestalt* (THECC). A and B represent Consciousness and Memory of individual Communicators, thereby *private spheres*, requiring the *public sphere* D for external communication to occur. Herein, Da represents *Communicative* Sinsign projecting the Addresser's intended expression Ba. Db, in a similar way, represents the Addressee's interpretation Ab *as it transpires from* the communicative process, sanctioned by its author Bb, i.e. the *final* (inductive) *Communicative Interpretant* Db. Dc is A's and B's shared, collective *Reference Object*. D is the *public* domain into which the Interactants export their semioses and from which they import the negotiated norms (Dd → Ad, Bd) and references (Dc → Ac, Bc), the latter phase *Idio-poiesis*/*Hypo-semiosis*. The individual, first-order *autopoietic* contributions A, B constitute *Discourse Acts*. They build up, or *conflue* into, the collective, or shared, *sympoietic Discourse* D. Together, first-order *autopoietic* A, B and their shared *sympoietic* product D

[55] So, just as the external D is a *we*-group of the *Actors*, Interpreter *I* (Db) and Utterer *you* (Da), inside the Communicator there is an internal *we*-group performing the *inner* dialogue/thinking/contemplating/musing (in line with Peircean semiotics).

[56] According to Collingwood (1947; cf. Schweikard and Schmid 2013), society "is nothing over and above its members. It has no will but the will of its members; no activity but the activity of its members; no responsibility but the responsibility of its members." As a kind of meta-consciousness, it could be named *syllogistic*, rhyming on *syn* 'together' and *logos* 'reason'. Notice then that the Meta-consciousness D is the abstractive *Über-welt* of A, B, C. It should be stressed that so-called organizational subjects (firms, legal assemblies, and what have you), legal persons, author collectives (newspaper editorial boards, i.a.), are only *would-be* agents, they need actual performers, *executive officers*, to get the things done – who are thereby liable and responsible for the things done (ruling out collective responsibility).

(including cultural norms, Dd) constitute a *second-order autopoietic* (para-poietic/peri-semiotic) system THECC.

As we have seen, Consciousness is not simply consciousness but bifurcates into two evolutionary stages, viz. Cognitive Consciousness in perception, with its single relation to an Object, and Communicative Consciousness, with a double relation – not only a relation to an Object but also a relation to a communicative Cosubject. As we have seen, Cognitive Consciousness comprises *impressions* and their senses and is simply abductive, whereas Communicative Consciousness comprises *expressions*, Aa/Ba, and their meanings, Ab/Bb, plus immediate objects, Ac/Bc, and is either abductive-receptive (Aa-Ac → Ab) or deductive-productive (Bb-Bc → Ba). Now, *cata-poiesis/meta-semiosis* constitutes the transmutation bridging these two stages. This simply means that there is an increase in complexity and order as well as *reordering* in Consciousness. We saw above that Cognitive Consciousness involves *eco-semiosis* with the *Umwelt* as containing the *dynamical* Object and Consciousness itself as supplying the presentative *Sensations* and interpretive *Senses*, the three of them constituting an actually occurring semiosis. *Communicative* Consciousness, on the other hand, has a mental *immediate* Semiotic Object (which may trigger, or be triggered by, sensational semiosis). The important factor here is thus *representationality*, whereby the immediate *Semiotic* Object is a proxy or representative, inside Consciousness, for a *dynamical Reference* Object (*Bedeutung*, Dc). The *immediate* Object is *energetic* and contracts *internal* semiosis with the semiotic Expression and Meaning evoked.[57] The semiosis occurring *inside* Cognitive Consciousness but requiring an *outside* Object is the combined *eco-* and *pheno-semiosis*. This has an opposite number on the Communicative Consciousness level in a *noo-semiosis*, a kind of which is the *Thinking Logo-semiosis* on the level of Language Gaming. It is connected with *eco-logical* semiosis whose basic kind is *imperative pointing* and whose prototypical target (*dynamical* Object) is the *Bedeutung*. Another important point is that, in eco-semiotic Perception, the external counterpart of the impression, viz. the *Sign Vehicle*, is *part* of the *dynamical* Object, whereas in eco-logical Communication, the *Sinsign* (corresponding to the mental *Expression*) is not part of the dynamical Object but exists on its own. I claim that it is not even part of the individual's *Umwelt* since it is *public* (*intersubjective*); and neither in the Cosubject's *Mitwelt*, for the same reason. The Communicative Sinsign rather belongs to the *public domain* (Da). To have a separate term for this region, we

[57] In Perception, the Sensations and Senses are activated by the *Umwelt dynamical* Object that has no corresponding mental *immediate* Object (*). In Communication it is different: the correspondent to the dynamical Object, viz. the *Bedeutung*, is more of a function whose identity it takes over from perception or is projected, or constructed, by the mental communicative *immediate* Object (o). This communicative *immediate* Object may attract the Sensation and the Sense from Perception as when you (feel you) can see or smell something when you hear or read about it. Notice also the phenomenon of *onomatopoiea* where the languaging expression iconically resembles the perceptual impression. Notice too that, with communicative evolution into verbal Language Gaming, Cognition may also evolve whereby, for instance, the Senses (ideas) one assigns to the Sensations may be influenced by the verbal categorizations (Meanings) – so-called Sapir-Whorf *Linguistic Relativity*.

could play on the German *Welt* in *Umwelt* and tentatively propose the name *Überwelt* as the term for this third realm (Frege; Popper), since it is over and above (abstracted from) the individual, private domains. Truly, the Sinsign has a counterpart in a potential *Qualisign* in the *Umgebung* (Cc): The Addressee (A) starts out with the acoustics (Cc) and interprets it as being an *uttered* (articulated) sign (Da < Ba) – significant, rather than insignificant noise.[58]

D is *public*/intersubjective (*polis*), in opposition to *private*/subjective *domains* A and B. A, B are *Minds*, and so is D – in Peircean terminology: *Communicative Mind*, or *Commind* for short. In line with the fact that A/B represent consciousness, D would have to represent *meta*-consciousness – *above* and *beyond* the concrete internal, private Minds, i.e. external to A, B. The individual Minds are either *actual* (*Consciousness*) or *virtual* (competence, *Memory*), and so is the *Commind*: The public traces (indexes, Da, Db) of the interaction between the Consciousnesses A, B also constitute an *actual*, external semiosis (*entelechy*), *Sympoiesis/Exo-semiosis*, and just like A and B harbor *procedural* competences (Ad, Bd), D actualizes a *declarative* community norm (Dd). In line with the trichotomy, *entelechy* (actual), *dynamis* (virtual, resource, competence), and *ergon* (past, potential), we must recognize the existence in society (D) of a *corpus* of bygone *communications* (*ergon*, i.e. texts), either *allopoietically* stored, or "gone with the wind", perhaps only registered in the individuals' "memories", from where they may be actualized as *wiederholte Rede* (Coseriu 1985). D cannot exist without A, B, C – they invigorate it; but A, B, C do not exist either without being 'publicized'. (D is the 'pivot' connecting A, B, C.)

As said above, Da and Db are *Actors* and constitute the *Intersubject*. They are the 'masks' that the *Interactants* 'wear'. *Da* masks the Addresser's Expression Ba, *Db* the Addressee's Comprehension Ab. The denotational Reference Object *Dc* is prototypically correlated with an actual *eco-semiotic* Real Object Cd that it *categorizes*. What characterizes *Languaging Semiosis* is *reciprocity*/symmetry – that the Subject and Cosubject identities switch roles.[59] In this connection, the *private domains* A and B come with their own, internal sub-worlds, viz. *Eigenwelt* (for *ego*) and *Spiegelwelt* (for *alter ego*). Thus, the Subject contains images of himself as Addressee and Addresser (Cosubject), as well as images of his Cosubject as Addresser and Addressee (Subject).[60] A crucial feature of (Co-) Subject is

[58] Even though the *Utterances* (Da) occur in the *public domain*, they are *indexical* with respect to their Addresser Ba and his physiognomy in Cb and phenotoken identity (e.g., age and gender/sex) – they are a kind of "voice print" of Ba. The final Interpretant (*Cominterpretant* Db) belongs with the collective, discursive *we* but is similarly indexical with the *effectual* Interpretant Ab in the Addressee's Consciousness.

[59] which is not the case with basic autopoiesis/eco-semiosis where Subject and Object are different identities, asymmetrical and cannot switch roles. However, if the observed Object is a (perhaps) conspecific organism, the roles may change, the Object becoming Subject, and vice versa, the obvious basis of Joint Attention-Action. Here, a Subject is looking at his Co-subject as well as at an Object, and vice versa, e.g. in collective hunting.

[60] *Linguistic* communicators also have images and interpretations of their Languages (Codes), e.g. as inalienable, intimate *mother tongue*, or as alienable foreign language; and images of the sur-

autonomy, self-governance, control, determination – thus the theory of *cybernetics*, of control(ing), self-regulating feedback systems where a judgment of the output of the system becomes input to regulating the system with respect to its future performance, a feature replicated at the *methodeutic* layer where the abductive-deductive stages represent this trial-and-error performance – and induction the updating and (counter-)validation of the system.

Consciousness is characterized by *psychological states* (*streams*): perceptual Consciousness by states of (emotionally motivated) awareness/attention; communicative Consciousness by *communicative intentions* (emotions, motivations, and reasons; e.g. beliefs, wants, and desires), the latter the mediational parts of *Utterance Meanings*. Psychological states are *directed at* the Signification Spheres and are the essential ingredients of *Communicative Acts* of reception and production. I stated above that the common pivot of Cognition (Perception) and Communication is the Subject (Perceiver/Addressee). Thus, the basic, propaedeutic perspective is the interpretational, abductive one. However, as is evident from linguistic ontology, there is an alternative perspective that is felt to be just as important, viz. the *expressional*, deductive one where the dynamical *Umwelt* Object (Cd) transmutated as *Bedeutung* (Dc) determines an *immediate* Object (Bc) that triggers an Intentional Interpretant/Utterance Meaning (Bb) determining an Expression (Ba) that is articulated (Cb/Da), as when the child looks and points at the moon and utters "moon!". Here, the child is the Addresser *Subject* – and the parent, who is the Receiver, is Addressee *Cosubject*, determinant by being a *sanctioning* judge. So, it is all about perspective and perspective taking at the level of Languaging Semiosis. This is a *Cata-poietic* transmutation from a basic *hermeneutic* perspective (in perceptual Cognition) into a derived *hypocritic* perspective (in Communication). The latter characterization is more evident as we get the *hypocritic* distinction between an underlying Utterance Meaning and a coding Word-and-Sentence Meaning on the layer of Language Gaming. The hypocritic perspective is further crucial in the deductive mode of the Language Gaming rules: type-Object >immediate Object →Interpretant >Meaning →Representamen >Expression (Fig. 17.7).[61]

Real Object (Cd)	↔	Sensation * Sense				
Reference Object (Dc)	↔	**Immediate Object**	↔	**Meaning**	↔	**Expression**
		↓↑		↑↓		↑↓
		Type-Object	↔	*Interpretant*	↔	*Representamen*

Fig. 17.7 The interaction between Communicative *Consciousness* (bold) and Communicative *Memory* (italics). Above this is Cognitive Consciousness

roundings (Dc) as arcane or profane (*Unterwelt*); likewise of the *Message* as intimate or official. Their *Contact* may, in the same vein, be interpreted as tight/intimate (serious/sincere) or loose/indifferent (insincere, uncommitted).

[61] Notice that the Expression in the Addressee's Consciousness corresponds to perceptual *Merkzeichen* whereas in the Addresser's Consciousness it corresponds to articulatory *Wirkzeichen*. This clearly sets Interpretation on a par with perception (*Merken*) on the Cognitive level, and Utterance with operation (*Wirken*). We saw above that *perception* is a sort of proto-abduction

17.7 Evolutionary Communication; Socio-Cybersemiosis; Poli-Poiesis/Hypero-Semiosis; Eco-Logical Semiosis

The above *dialogical languaging* level evolves into a *layer* of *Evolutionary Communication* which triangulates into the successive levels of *Signaling*, *Sign Playing*, and *Interlocution* (layer: *Language Gaming*). These levels are governed by, respectively, primary, secondary, and tertiary intersubjectivity, with respect to the kind of *Nexus* (D) being established between Subject A and their Cosubject B with respect to the Context C. Tertiary intersubjectivity involves the bifurcation between a Speaker's Utterance Meaning and their Word-and-Sentence Meaning: The Speaker may be insincere, meaning one thing and saying another, *equivocate* (cf. *hypocrisis*) – thus, the concept of *persona* – mask or face – which the language gaming Speaker may *control* (Buck and VanLear 2002). Though "deception" is found on the ethological level, too, it is never individually chosen by the Organism – feigning is 'indexical', genetic. A crucial concept on the layer of Language Gaming is thus *hypocrisis*, the Ancient Greek term for theatrical playing (use of masks) and rhetorical performance (*actio*/*executio*). Word-and-Sentence Meaning is *instrumental* convention (*organon*) with respect to the Communicators' Utterance Meaning (Intentional/Effectual Interpretants).[62] Utterance Meaning is a combination of mediational and representational contents: communicative forces and their scope. Cognition is private subjective whereas Communication triggers this public intersubjective *Mediation*. On the layer of Language Gaming, the public domain D, via its declarative Community Dialect Dd, and by being internalized into *procedural* Communicative Competences (Ad, Bd), is instrumental for the Interactants/Interlocutors.

(*afference*), whereas *operation* is a kind of proto-deduction (*efference*), the feedback mechanism being a sort of proto-induction (*re-afference*). Accordingly, Reception is abductive, Production deductive.

[62] A cardinal exposition is Austin's "How to do things *with words*" (Austin 1962). In any case, the bifurcation, between the sincerity conditions (psychological motivations and communicative aims) and the utterance used in communication, goes back to the evolution of instrumentality (*organo-poiesis*) and the *cata-poietic* transmutation of the individual Consciousness in feeling and sensing into symbolic coding. In Signaling and Sign Playing there is no instrumentality involved whereas in culturally transmitted Language Gaming the *instrumentality* is introduced between an illocutionary and a locutionary layer of meaning representation. Illocutionarity and Locutionarity, in their turn, may be seen as instrumental with respect to the *Perlocutionarity* of the *tandem* of the signaling and sign-playing levels. This means-end structure I label *organo-poiesis* (cf. Bühler 1934; Vygotsky and Luria 1930; Vygotsky 1978).

17.7.1 Emotional Signaling; Symptomatic *Signification*

Emotional Signaling represents the lowest level of Evolutionary Communication (cf. Darwin 1872; Hatfield et al. 2014; Hess and Thibault 2009; Buck 2014). We have already mentioned *Emotional Declarative Pointing*, but the cardinal example is *facial expression* of emotions. A *Signaling Habit* (in the *Autonomic Nervous System*, ANS, and part of PNS) connects emotional psychological Interpretants with their emotional bodily expressions (Signals). Thus, when emotional Intentional Interpretants are activated as actual intentional emotions in the Communicator's Consciousness, this actuates corresponding ritualized emotional Signals (Ba) in their Consciousness which are outwardly articulated into the bio-physical *Real* World (C) and the communicative *Social* World (D) as objective/public facial expressions and bodily postural changes (Cb/Da).

As with visual perception, the point of departure is a situation where an individual organism Subject (A) experiences an emotion-triggering phenomenon (e.g., frightening stimuli, Ca), generates a feeling impression in his Consciousness (Aa), which gets interpreted (explained) by an emotional interpretant (sincere feeling, e.g. fear; Ab) that via an emotional habit is *involuntarily* displayed, e.g. by a sincere *facial* display – an automatic *Symptom*. This intrasubjective, cognitive reaction may evolve into a communicative reaction whereby the Subject (Emoter, Ab) has turned into Co-subject (Addresser, Bb).[63] And as with Joint Attention-Action, a communicative situation requires an interpreting Subject (Addressee) to receive the emotional Signal. This Subject ends up co-experiencing the Cosubject's feeling (*primitive emotional contagion*), when the Subject (Addressee) activates the same feeling as the Cosubject's (Emoter's/Addresser's) via the latter's Symptom (mimicry, synchronization) and owing to their possibly shared emotive situation (Cd). This is *communicative* Emotional Signaling.

Emotional Exo-semiosis is not denotational in the sense that there is a *Reference* Object (Dc) correlated with the expressive Sinsign (in this way differing from deixis). However, emotion-eliciting events or situations (Ca) may be said to trigger actual intentional emotions (Bb), this in turn triggering Emotional Signaling, thus firing emotional Signals (Ba) manifested as public Sinsigns (Da, e.g. *laughing*). Emotional Expression is an intra-subjective *Symptom* (Ba) and an inter-subjective *communicative Signal* (Da). Emotions are determined by organismal Subjects' motivational states and *primary intersubjectivity* and, on the level of Language Gaming, expressed according to socially learned *display rules*. Emotioning is universal but shows *glosso-cultural* dialects. Emotional Signaling evolves into emotional illocutionary acts in Language Gaming (expressed by locutionary expressives

[63] The description is normally that you (ii) mimic your co-communicator's (i) Utterance (Ba(ii) = Ba(i)), and thereafter activates the Interpretant emotion implied (Bb(ii) = Bb(i), a *non-deductive* kind of Utterance production – *abductive* it seems, since the implied content comes last, which is in line with the fact that it is the first, emotive-iconic stage of the evolution of Communication.

and interjections). The emotional expressions (Signals, Da) are interpreted (*Communicative Interpretant*, Db) as *effectual* emotions (Ab), and correlated with their stimulus situation (Ca/Cd). The emotion Addressee (Ab) turns into next-turn emotion Addresser (Ba).

Primates and birds may perform *collective Signaling*, either in the form of *chorus* vocal behavior or *duetting* (Brumm and Slater 2007). The communicative purpose is to signal sociability, group cohesion, pair bonding – the maintenance of long durational pair bonds. The communicative contributions are so much synchronized that one may talk about a collective Signal (Da), with a collective meaning of pair stability, pair bond strength, commitment, and ability to cooperate (Db). Turn taking may be alternations of male and female pair parts. This is the precursor of Communion/Phatic Semiosis.

Emotional Contagion is the final form of Signaling to be mentioned, since it highlights the analyses I have undertaken of Cata-poiesis/Meta-semiosis. Taking an Addresser's (i) expression (Sinsign, Da, e.g. a smile) as input, the Addressee (ii) abduces the former's Utterance Meaning (Bb(i), e.g. joy, now the latter's Effectual Interpretant, Ab(ii)) and reproduces it as his own Utterance Meaning (Bb(ii), also joy), expressing it (articulation of motor representation (Ba(ii), e.g. smiling; Da(ii)). It is a simple sequence of action-reaction. The emotional contagion lies in the *reproduction* of the emotion (Utterance Meaning) and of its expression (*mimicry*). This requires *empathy* and an ability for *mimesis*. The brain part responsible for this is the *Mirror Neuron System*. A transitional type of Emotional Signaling is *counter-contagion*, where, e.g., one's anger is met by another's fear (just like a question is met by an answer, etc.).[64]

17.7.2 Motivational Sign Playing; Instinctual *Signification*

This ethological level of exo-semiosis is characterized by secondary, *motivational* intersubjectivity. The kind of eco-logical semiosis on this level is *Instinctual Signification*, and the Eco-logical System created is *etho-ecosemiotic*. Where Signaling is based on emotions (First), Sign Playing is driven by ethological *motivations* (Second). If the Organismal Sender has the requisite emotions and motivations in Consciousness, Key/Sign Stimuli (Sinsigns) in his Instinctual Signification Sphere trigger an Innate Release Response Mechanism (*IRM*) of the Ethogrammatical Habit which fires an ethological Communicative Act of *Sign Playing* (Brier 2008, ch. 3, 8). This is a clear-cut example of Peircean proto-deduction. The release mechanism has an innate, phylogenetic foundation. This may evolve into a system which additionally caters for accretions and updating by way of *cultural learning*, seen on

[64] Contagion is inherited in Language Gaming, as found in the wildfires that are caught on social media (e.g. shit storms; cf. Kramer et al. 2014), the most conspicuous one being the exploitation/manipulation of illegally harvested user data in the 2016 U.S. American presidential election, by Cambridge Analytica (Illing 2018).

the next layer of Language Gaming with its level of Tradition – a major transmutation in evolution, for which I used the term *Paideia-poiesis*/*Meta-semiosis* (the prerequisite of which is *Poli-poiesis*/*Hypero-semiosis*). Whereas Mimetic Signaling involves Mediation which targets emotional-interpretational and expressional *diagrammatic* similarity between Subject and Cosubject, becoming *reciprocal icons* (i.e. mimicry, mimesis), the Mediation between Subject and Cosubject in *Motivational Sign Playing* targets causal/ethological *determination*, to the effect that the Cosubject (B) emits Key Stimuli (Ba > Da) which the Subject receives, automatically interprets as the *Effectual Interpretant*, Ab (= Intentional Interpretant, Bb), and responds to. In this way Subject and Cosubject become *reciprocal indexes* in the Action-Reaction pairs of their bodily Sign Playing.

17.7.3 *Evolution of* **rational-reflexive** *Social Mind – Deonto-Poiesis/Nomo-Semiosis; Interlocution*

The third level of Languaging is the end stage of Evolutionary Communication (cf. Hurford 2007; Fitch 2010), termed *Interlocution*, stressing the fact that it concerns the evolution of rhetorical *illocutions* and their language-specific coding as lexicogrammatical *locutions* occurring in conversations, *Dialogical Semiosis*. Here is the *genotype* of the Human Language Faculty, present in each single individual human being at birth as a *geno-token* language. Interlocution is characterized by *tertiary intersubjectivity*, by *deliberative*, *dialectic rationality*, *argumentality*, and *deontology*. A transmutation of *deonto-poiesis*/*nomo-semiosis* links deontological Language Gaming with non-deontological emotional-symptomatic and motivational-instinctual Languaging. Thus, undercurrents of preverbal *perlocutions* become superimposed, first by a level of *illocutionary* Utterance Meaning, second by a level of deontological *locutionary* Word-Sentence-Text Meaning, such that it is the latter for which the Speaker is responsible.[65] The basis of Interlocution is the *normative* system of dialogical *turn-taking* (cf. Sacks et al. 1974; Stivers et al. 2009), whose rules are conversational *targets*. Likewise, *illocutionarity* and its relation to deontological *locutionarity* is based on a *Principle of Cooperation* and *Conversational Maxims* (Grice 1975), also targets in Language Gaming.

Interlocution has its Signification Spheres: when conversing, we construct a *Universe of Discourse* (Dc) parallel to the sensory-motor *Umwelt* (Cd). The *Mitwelt* (B) and *Überwelt* (D) of Interlocution concern communicating persons, social facts, organizations, institutions, and societies (*Polis*). Just like an Organism and its

[65] This *trifurcation* of meaning is a result of the bifurcation of *Languaging Semiosis* into Signaling & Sign Playing (cf. Perlocution) vs. Interlocution and of the latter into Illocution vs. Locution. The practical *Symbolic* level is the final level, co-evolved with the level of *social contracts* in Sympraxis (cf. Deacon 1997; Searle 2004). The Language Gaming deontology is a parallel to societal deontology, thus my concept of *Poli-poiesis*. A precursor of this level is the transmutational *mimetic level*, where *Paideia-poiesis* seems to originate (cf. Zlatev 2014a, b).

Table 17.10 The evolution of the *Semio-sphere*

Semio-sphere	Subject (A)	Signification Sphere	Cosubject (B)	Gestalt/Totality A*B*C*D
Cognition: Eco-semiosis	*Cognizer*	*Umwelt* (Ca, Cb, Cd)	Co-cognizer	*Eco-semiotic system*
Communication: Eco-logical semiosis	*Addressee* (destination)	*Deictic Sphere* (Dc)	*Addresser* (source)	*Eco-logical system*
>interlocution: *Discursive* eco-logical semiosis	>*Interlocutor* (addressee)	>*Universe of Discourse*	>*Interlocutor* (addresser)	>*Culture* (civilization)

Umwelt build up an *Eco-semiotic system* in *Eco-semiosis*, so on the level of Interlocution, we construe a *Culture* (Civilization) based on *Discursive Exo-semiosis*. The *Culture* is then a kind of Eco-logical System. Herein the Universe of Discourse is a kind of Deictic Sphere (Table 17.10).

In the evolution of the *Semio-sphere*, 1. Eco-semiosis, the *Umwelt*, and the Cognizers yield the *Eco-semiotic System*; 2. Eco-logical Semiosis, the Deictic Sphere (Dc), and the *Communicators* yield the *Eco-logical System*; 3. *Discursive* Eco-logical Semiosis, the Universe of Discourse (topical Object, Subject Matter), and the *Interlocutors* (responsible for the Discourse Acts), together form the *Culture*.

The logic behind this is simply that the interpretive Interlocutor (Subject, A) has an integrated complement, viz. his *relevant* Context of *Universe of Discourse* (Dc) and Cosubject (B). Interlocutors constitute a *Society*, which is basically a *Community of Practice* (Lave and Wenger 1991), a kind of relevant macrosystem which projects the Universe of Discourse. Like a figure and its ground, the Interlocutors (A/B) and their surroundings (complement: C, B/A, D) constitute a *totality* (Gestalt: A*B*C*D), macrosystem in which they themselves partake. This macrosystem (*Semiosphere*) is a relevant unit of selection in biological and bio-cultural evolution. It evolves in co-adaptation with the neutral *Umgebung* (Cc; Conditions of Living), the totality of which is *Nature* (cf. our absolute, *methodological* naturalism). Notice that *Society* (*Polis*, D) is the nucleus of *Culture*, and that Cc (nature, in the narrow sense) is outside *Culture*.

As regards the Universe of Discourse and the *hypocritic* character of Language Gaming, with its distinction between Utterance Meaning and Word-and-Sentence Meaning, there are *sincerity* and *responsibility conditions* on normal Language Gaming, to the effect that one should be sincere and "speak the truth", or at least that one is *committed* to the truth of what one is saying, i.e. one must take responsibility for one's utterances.[66] However, this only pertains to *sincere* and *committed discourse functions* – a crucial feature of Language Gaming is the alternative *fabulating function* (Ross 1968), as used in narrative fiction – cf. *licentia poetica*. Here, one is not committed to the truth of the 'ficta' that one is narrating. So, I propose that the Universe of Discourse is bifurcated into the normal *deictic* Universe of

[66] Hence, the current focus on "fake news" and so-called "alternative facts" in the (social) media.

Discourse (correlated with the *Real World*) and a *Surreal World* of fictional characters and events.

A different perspective on the 'reality' of the Universe of Discourse *Object* concerns the 'direction of fit', or *tropicality*, between the Discourse and its Universe of Discourse, and especially the fact that Language Gaming may create a social fact (Dc) by stipulating (declaring) it – *double direction of fit* (Searle 1989), and that e.g. imperatives require a *prospective* fact to be created by the Addressee's obeying the underlying order. In fact, only in expressives and assertives does the Universe of Discourse *Object* exist beforehand[67] and *determines* the Utterance Meaning in the hypocritic perspective. In the *constructivist* interpretation of von Uexküll and Maturana, the *Umwelt* is a *subjective* creation – the Social World an *intersubjective* construction. Thus, Language Gaming (Discourse Semiosis) projects the Universe of Discourse (i.e., 'social construction of reality').

Interlocution is fundamentally *reciprocal* (symmetrical), meaning that the Subject may be *deductive* and then performs the function as *Sender* (Addresser), or *abductive* and then performs the function as *Recipient* (Addressee). Consequently, the *Mitwelt* of a Sender Subject is an *Addressee* Cosubject, and of a Recipient Subject a *Sender* Cosubject. And since each person may be both Sender and Recipient, he has an *image* of himself (*ego*: *Eigenwelt*) and of his Interlocutor (*alter ego*: *Spiegelwelt*). This implies that, like Cognition's internal *Pheno-semiosis* (*cogito*), Interlocution has an *internal dialogue* going on between the internal instances of *ego* and *alter ego* (*loquimus*), the *Thinking Logo-Semiosis* alluded to above.[68] Furthermore, the Sending Subject is simultaneously a *Perceiver* of his own utterance (he can hear (see) his own utterance/semiotic display), i.e. a secondary, *feedback* Receiver, and thus his own *alter ego*. Therefore, he is also part of his own *Spiegel-welt*: He has an image of his *public mask* (self-perception) – he is a *persona*.

The Subject and Cosubject are *reciprocal Symbols*, in that they co-adapt to and co-create each other's *conventions* (Ad, Bd). In opposition to the two previous levels, this one concerns epigenetically *acquired* habits and *cultural* transmission. This *Paideia-poiesis*/*Meta-semiosis* pertains esp. to *Tradition*(See Sects. 17.8.3 and 17.9).

[67] Ross' (1968) conception is more to the point: In assertives the Topic is '*thought* of as real', in directives it is a '*pattern* of behavior'. In both cases the proposition *constructs* the states of affairs (*Reference* Object) in social reality (Dc). Derivatively, it is a question whether a *Real*-Object correlate exists (cf. assertives and expressives) or is brought about to exist, deliberately (cf. commissives and directives) or "automatically" (cf. declarations, cf. "I hereby declare the *exposition open*").

[68] In this sense, this is *social auto*-poiesis, related to the external, exo-semiotic social *sym*-poiesis. The person constitutes his own *internal Society* as a system of communications, giving rise to *personal identity* (continuity). Notice internal, or internalized, *vox mentalis*.

17.8 Language Gaming; Glosso-Semiosis; Thinking Logo-Semiosis; *Conceptual* Signification

Whereas the interlocutionary *level* concerns the *phylogenetic* evolution of the species-specific *blueprint* of Language Gaming (and the Human Language Faculty), the corresponding Language Gaming *layer* focuses on the *onto-* and *epi-genetic* acquisition and change of the specific lexico-grammatic competence taken as ruling in a given individual's Community of Practice, more generally, her speech community. Language-specific Language Gaming I term *Glosso-semiosis*. As an intra-subjective dialogue it is *Thinking Logo-Semiosis*. This layer is historical-cultural *memetic*, whereas its "backing" level is evolutionary-natural *genetic*. Corresponding to the *hypocritic* distinction between Utterance/Discourse Meaning and Word-Sentence-Text Meaning, we shall conceive of the Communicative Competence of a given Interlocutor/Interactor as di-stratal, i.e. as having a *discourse-semiotic* basis and a *glosso-semiotic* superstructure. In accordance with the radical *hypocritic* character of Language Gaming, this level warrants the possibility of coding *feigned* emotions and motivations of the Signaling and Sign Playing levels (Buck and VanLear 2002: 527), as evident, of course, from theatrical performance. Therefore, the Communicative Competence ends up being tri-stratal, with a preliminary *perlocutionary* stratum (< Signaling & Sign Playing), plus the *illocutionary* discourse-semiotic stratum, and, finally the *locutionary* glosso-semiotic stratum. In correspondance with the *individual* anchoring of we-intentionality, what the individual intends on this layer is perform *individual*, singular *Discourse Acts*, intended as *complementary* part of a shared participatum (collective *Discourse*), but since *I* add up to a *We* by including a *you* in my Sphere of Influence (*Mitwelt*), and vice versa, that *you* as an *I* include *me* as a *you* in your Sphere of Influence, *we*, together, reciprocally, perform collective *Discourse* – provided we "establish contact" on the preliminary level, *Communion* (Sect. 17.8.1), if we agree on the common plan and goal.[69]

Language Gaming is characterized by three necessary and sufficient component *factors* (besides Subject, Cosubject, and Object), viz. *Contact* between Communicators (*Communion*), *Messages* exchanged between them (*Practice*), and *Code* (Method/Habit/*Convention*) targeted by them and *via* which they perform. From this we get the three corresponding, simultaneously occurring semioses: phatic *Communion*, poetic *Practice*, and metalingual *Methodeutic* (→ Tradition). On each level, *negotiations*, or games, are undertaken by the Communicators with respect to the given communicative function. These negotiations are manifested in

[69] Strangely, there is a debate about collective intentionality – we wouldn't debate the fact of gendered reproduction (Darwin 1871); we would *not* dream of saying that it is the couple as a *macro-organism* that does the reproduction when it is evident that it is the individuals who are co-performing the sexual intercourse, and that they each contribute with half of the coin. Likewise, we would not claim that a game of chess plays by itself – that the players only perform the function of contextual background "puppets" of the game, as already dealt with in previous sections.

sequences of moves (*turn taking*; cf. Sacks et al. 1974). For instance, a Sender may invite a person to participate in a contact-oriented conversation, by saying *Hi*. The contact is then established by the Addressee-turned-Sender's accepting the invitation by returning a *Hi* (or, rejecting by not responding).

We may be more precise in the characterization of the three component factors, Contact, Message, and Code: they all constitute *facets* of the *mediating* D-component above. The Contact is to be understood as a *Medium* – "bridge" – between the Interlocutors, in terms of the *Matter* (*purport*) of the semiosis.[70] This means that the Interpretants function with respect to the psychological connection (Db), and the Representamina with respect to the physical channel (Da). (For a moment we shall skip the Object component here.) The *Message* (or, Discourse) connects the two interactants in the way that the content plane of the Message (Db) is *what* is communicated, whereas the expression plane (Da) is the *how* of the Message, and the public Denotatum is collateral extension (Dc). The Message is focal in the exo-semiotic *Practice* of Language Gaming unfolding a *declarative* community Convention (public virtual habit, *dynamis*, Dd), the focus of *Tradition*. As a mediator, this *Convention* is the *Community Dialect* (Dd), whose semiotic relata (Dda, Ddb, Ddc) are negotiated on the layer of *Tradition* and, via *Idio-poiesis*/*Hypo-semiosis*, re-entered into the private, *procedural* dialects (A/B–da, A/B–db, A/B–dc).

17.8.1 Communion – Phatico-Semiosis

This level concerns the *Contact* (*Nexus*) between the *Interlocutors* – their Mediation in linguistic encounters (cf. Malinowsky 1923). Via this Mediation (*oikeiosis*) they constitute networks (*we*-groups, communities of practice, speech communities, institutions, societies; D). These groupings are based on similarity (inclusion) vs. difference (exclusion). The first group, the delimiting case, is the *I-group*, since the *individual* Interlocutor constitutes the *atom* of society, due to his *we*-intentionality *cata-poietically*/*meta-semiotically* based on *I-intentionality*, inherited by being also Cognizer/Perceiver, and his possession of an internal *Spiegelwelt*, in addition to his *Eigenwelt*. The Interlocutor develops an Identity and a Self over time, by being, or at least including, a growing semiotic Convention (*Symbol*), and differentiating himself from his surroundings.[71] Factors of group solidarity may enhance the communicative networks.

The individual Organism possesses *we*-intentionality, valency for contracting *we*-groups (not that the groups themselves have intentionality) and for participating in multi-subject activities, like engaging in conversations (discourses). Since the

[70] In Peirce's *hylo-pathic*, or *hylo-zoic*, acceptance, which combines psychological "mind" and physical "matter" into a single *monistic* substrate, *Matter* (Brier 2017a, b).

[71] At the biological level, something similar occurs owing to the immune system, and one speaks of a *biological* self (cf. Brier 2008).

minimal conversation solely involves a Sender producing a Discourse Act and his Addressee (which may be himself, in monologues) receiving it, performing a *receptive* Discourse Act – at least virtually, a conversation may per definition be a *monologue*, this of course being the limiting case of conversation.[72] In the cardinal case of a dyadic dialogue, a principle of *Audience Design* is operative, viz. that one (co-) adapts to one's *Mitwelt*. Specifically, this level concerns the establishment and maintenance (resp. disruption) of the Contact and Mediation necessary for communicative behavior. So, the first move is a proposal for connection, or a recognition of an already existing connection, as when you salute someone by removing your hat (this also indicating respect, deference and politeness). The maintenance consists in securing that the Contact is still effective ("on"), either ongoing in the Discourse (uptake), or closing the conversation (as when you say, "stay in touch", "see you", and what have you). The proposal can be rejected, or the connection is not recognized as existing (as when you don't salute back).

The level of Communion not only concerns the psychological Contact between the Interlocutors, it also pertains to the physical and physiological Mediation, as the physics of the Channel and the sensory-motor performance responsible for the physical manifestation in the Channel. In a wider perspective it concerns the *physical settings* of the Communication and the physical distance between the Interlocutors. This is Mediation in terms of *topos*. On the basis of the deictic anchoring of the Interlocutors' Consciousness (*hic et nunc*), they establish intersubjective spatio-temporal coordination. In an even wider perspective it concerns the body posture and gaze aversion (with respect to taboo relatives; cf. also male-female handshake taboo) or conversion (as when in the West you have to do the opposite, look the Other in her eyes, to signal respect – "Look at me when I speak to you!").

17.8.2 Practice – Poietico-Semiosis

Where behavior in general and communication more specifically can be characterized as *practo-poietic* (Nikolić 2015), Language Gaming's level of *Practice*, concerning illocution and interlocution (verbal communicative interaction), is *poietic* (Bühler 1934; Jakobson 1960), since it focuses on the *creation* and comprehension of Messages, or Discourse. Therefore, the overarching layer is *Discourse Semiosis*, and the pivotal level *poietic semiosis* (illocutionary action and interaction). Discourse has its foundation in the Communion between the Interlocutors, and with a Nexus ("bridge") being established between them in terms of psychological connection (cf. emotional Structural Coupling) and physical medium (modality), a way

[72] One might speculate that (schizophrenic) persons hearing voices also perform a minimal conversation, in this case as Receivers. And notice that they may respond to these voices, and even obey orders that they "hear". We may surmise that the functioning of their *Eigenwelt – Spiegelwelt* is disturbed. Writing in one's private diary (not meant for publication), one in a way externalizes an inner dialogue.

is open for their negotiating a common Message (Discourse). Here, the relevant Universe of Discourse with its topical Objects (Dc) is a required valency (cf. Bühler 1934) – the *referential* function. Where the *topicality* of the Message, building alethic propositions, is the semiotic pivot in the triangulation (*Logos*), the *meta-semiotic* focus on the Interlocutors (Utterer/Interpreter) yield the *emotivity* and *appellativity* (*Pathos* vs. *Ethos*) of the Message. The illocutionary attitude (psychological state) is born with a *referential tropism* whereby the propositional content (*logos*) is 'directed towards' the Object (*Bedeutung*) in such a way that the content has to 'fit' the Object (as in Beliefs); or the other way around (*tropos*), the Object has to 'fit' the *pattern of behavior* denoted by the proposition (as in Wants and Desires); or both ways as in Declarations; the limiting case being the presupposed fit in Expressives. The *Neustic*, with its values of Acceptance and Rejection, is operative in Judgments, both normal, object-level propositions (positive – negative), and meta-level *critico-poietic* Judgments, sanctioning verbal behavior as norm-following or norm-breaching. External *Discursive* Logo-semiosis and internal *Thinking* Logo-semiosis are both trading in propositions (*logos*) and arguments (syllogistic *delomes*), and therefore the *partes orations* (discourse parts) of semiotic logic are relevant in the *phrastic* part of discourse.[73]

Owing to the *hypocritic* character of Language Gaming, distinguishing between *illocutionary* Utterance Meaning and its implementing codal *locutionary* Word-and-Sentence Meaning, a valency is opened for the verbal target Code. Thus, the term *Glosso-semiosis*, stressing the normativity and constraints in the form of specific languages regulating verbal behavior. It is important to mention here the *deontological* character of the verbal-symbolic Code: it is a superstructure on languaging competency. Whereas Signaling and Sign Playing levels primarily generate *holophrastic* Messages, Language Gaming *Practice* generates *syntactically* articulated Messages: The linguistic competence (*lexico-grammar*) governs the locutionary process of *syntaxis* (*syntacto-poiesis*).

The exo-semiotic Discourse is the negotiation or negotiated result of the individual Interlocutors' Discourse Acts with respect to the Context (Svennevig 2001; Verscheueren 2008). In fact, each and every instance of the Language Gaming *Practice* is connected with an instance of *Sympractice*, so that the Interlocutors co-create their *social reality* (Dc) as a Practice-Sympractice pair. This may be illustrated by the kind of performative Discourse Act termed *Declaration*, with double direction of fit between Language and Reality (Searle 1989), and by which social reality is created by *stipulating* it. For instance, when the right authority names a ship *Queen Elisabeth*, its name is thereby and hereafter *Queen Elizabeth*. Here, the *instrumentality* between illocutionary intention and locutionary act is evident: "I

[73] I operate with a functional structure of the Discourse Act (cf. Ross 1968), with a *Topical* level (concerning the referential subject matter), an *Alethic* level, on the propositional truth (correspondence with this subject matter), a *Tropical* level concerning the *direction of fit* between World and Words (cf. Searle 1969, 1983), a *Phrastic* level concerning syntacto-poietic discourse structure; a *Neustic* level as to illocutionary attitude concerning the propositional content, and, lastly, a *hypocritic* level concerning 'sincerity and commitment' of the Communicator as to his Discourse Act.

hereby name this ship *Queen Elizabeth*". Dc represents *institutionality*, which is an *intentional* (conceptual, ideal, ideological, axiological, obligational, functional) entity that has an opposite number in collaterally experienced *reality* (Cd). Also, a language as a social institution (*idioma*, *declarative* grammar, Dd) is created in D. Notice the *ontological* difference between a 'public thing', like the named ship, together with its total social network of public 'things' (*Res Publica*, *Polis*), and the linguistic *means* of communication, like the *name* with its total socio-linguistic paradigmatic network (*Paradeigma*) of its specific language.[74] The level of Practice is governed by *communicative rationality* and *discourse ethics* (Habermas; cf. Fuchs and Hofkirchner 2009). These characteristics originate at the level of Interlocution (Sect. 3.3), where *cooperation* and *altruism* are the prerequisites of the evolution of verbal Language Gaming (cf. Hurford 2007).

17.8.3 Evolution of **Cultural Mind** – *Paideia-Poiesis/Meta-Semiosis; Deonto-Poiesis/Nomo-Semiosis*

The Code (Linguistic Norms, *Deontology*) of the Interlocutors is not an efficient cause but a *telos*, a target that one is committed to follow, an *obligative* attractor (Thomsen 2017). On a metalingual, *legislative* level this Code is negotiated by the Interlocutors. On this *methodeutic* level (cf. Peirce), the semiosis going on is *Nomo-semiosis*, stressing the fact that it concerns the rules (or habit, *nomos*) that are the deontological targets of especially the *Poietico-semiotic* level. The *law* component in Language Gaming comes with a genetically inherited foundation (universal principles and pre-fixed parameters), unchangeable (inalienable *Read-only* Memory), but, additionally, also with a changeable, *learnable*, parametrical-typological *memetic* superstructure (alienable *Readily-Accessible* Memory), thus, the distinction between genetic inheritance and *cultural transmission*, *Paideia-poiesis*. The creation of Norms (*Deontology*) is *Deonto-poiesis*. As against the efficient causes on the pre-verbal levels of Communication, the deontology of the verbal level of Language Gaming is a *finious* cause, a normative *target*. Therefore, the method or habit on this layer does not exist "beforehand", pushing the behavior, but exists "virtually" as an *attractor* – "pulling" the behavior.[75]

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[74] I take it that a *community Language* is a complex *Symbol* (conventional *argumental sign system*) which only exists in its instances, the *token procedural* grammars of the Interlocutors, whereas a public entity, although being institutional, is not significative (not a Symbol), and is manifested in substantial matter (like the paper of a bank note). However, it is *collectively inscribed* with a *symbol* for its function, thereby subjected to, interpretable and usable by, each social agent. Notice the interesting difference between a perceptual object whose *Sign Vehicle* is an *inalienable* part (property/feature) and a *res publica*, whose (symbolic) *inscription* (Sinsign) is assigned, and *alienable* (replaceable when the thing is no longer *current*, e.g. when the president has resigned, the king abdicated, or the institution abolished, or made obsolete).

[75] Perhaps one should say that the hermeneutic mechanism of perception (Cognition) and the *hypocritic* Code of Language Gaming (Communication) both have a 'law' component, viz. a 'precept',

The layer of Language Gaming, focally the level of Practice, is based on a *Community of Practice*, where a given activity is connected with its learning, and where the learners are allowed to practice without being fully competent (*legitimate peripheral participation*). Here, *Paideia-poiesis* (rearing and education; cf. Fitch 2007) with reflexive *Meta-semiosis* is the decisive factor with respect to the previous levels of Languaging Semiosis.[76] It is evident that there are functional roles characteristic at this level, too, viz. Model (*Master*) and Learner (*Novice*), and they function in both *hermeneusis* (abduction: learning, acquisition of norms) and *hypocrisis* (deduction: testing of hypothesized norms; instruction of currently valid norms; and induction: confirmation/conventionalization). They belong to a *meta-semiotic* level. However, in the individual-society dialectics of this level and the following layer, we not only go from individual to society but also in the opposite direction, from the public domain to the private domains, and for this direction the names *Idio-poiesis* ('privatization') and *Hypo-semiosis* have been chosen.[77] Not only the linguistic norms, in the form of a *glosso-semiotic lexico-grammar*, are acquired or negotiated, but also, in parallel and integrated herewith, an *encyclopedia* of world knowledge. As a kind of *Gegenwelt*, this knowledge is correlated with our Universe of Discourse and thus co-constructs our *Lifeworld*.

17.9 Tradition; Memetico-Semiosis; Critico-Semiosis

Input to the layer of Tradition is pre-Language Gaming 'indexical behavior', whereby *Key Stimuli* in the surroundings trigger a phylogenetic *Innate Release Mechanism* (IRM) providing for action, viz. "language acquisition". That is, at birth newborn human infants are confronted with linguistic and other semiotic and non-semiotic experiences, some of which function as Key Stimuli triggering the IRM *Dialect Acquisition Mechanism* (DAM,[78] a congenital habit), functioning as universal law in

in the former case between a *percept* (Presentamen), a categorial type Object, and a *concept* (Interpretant), where the triggering of the type Object triggers perceptual recognition, and in the latter case between Representamen, type Object, and Interpretant, where the co-activation of the type Object and the Interpretant implicates the Representamen and thereby the Expression on the level of linguistic Consciousness. The two precepts differ in their directionality: *hermeneutic-abductive* vs. *hypocritic-deductive* (Andersen 1984).

[76] Perhaps it should be mentioned that this, of course, is integrated with the Sympractice of *socialization*.

[77] Since the public domain is an *Über-welt*, the individuals must be below (*hypo-*).

[78] Of course, reminiscent of the Chomskyan *Language Acquisition Device* and Thrane's (2004) *Language Interpretation Device*. I have retained the term 'mechanism' from ethology, not to associate too much with the generative paradigm and biolinguistics, and I have changed the label 'language' to 'dialect'/'discourse', since what you acquire is a (personal) dialect, and what you interpret is a 'discourse (act)'. The *Dialect Acquisition Mechanism* (*DAM*)/*Discourse Interpretation Mechanism* (*DIM*) are dedicated faculties, distinguished from general-purpose principles, as e.g. universal *social-problems-solving algorithms*.

the abduction of a concrete communicative competence, on the basis of this linguistic experience. The hypothesis, then, is that the DAM has to be *activated*. It also means that the linguistic input experience changes status from being a strict perceptual Object to being an Object construed as the *Result* (Received Da) of a Practice Utterance produced by the Learner's Model (Ba). When the Learner puts his own, preliminary communicative competence to test in language production and reception, he produces communicative behavior (Bb-Cb → Ba), whose governing Law is an inborn *Discourse Interpretation Mechanism*, this DIM likewise being activated in the confrontation with the linguistic primary experience (Da). Propaedeutic to this level is emotional Signaling (mimesis) on the deepest level of human communication (Trevarthen 2002), based on a simple *mimetic* languaging communicative instinct. We then have this tri-stratal hierarchy of language acquisition:

1. *Iconic*/mimetic (Empathy) < 2. *Indexical*/stimulus-response < 3. *Symbolic*/cultural abduction (Tradition)

An important complement to Norm *targeting* in Practice, when deductively producing discourse and abductively receiving it, there is also the *meta-level* of Norm *judging* and sanctioning, *Critico-semiosis*, on the level of Tradition, as when the Master judges the Novice's behavior as either Norm conforming or Norm breaching (Coseriu 1957, 1988; Andersen 1989).[79] The judgments may be externalized on the level of Practice in the form of Norm enforcement – corrections and sanctioning. Also in line with the cybernetic character of Communication, the Interlocutor simultaneously functions as his own judge, monitoring his Discourse Production as either conforming or not with the norms that he has internalized and targets in his communication – and accordingly produces self-corrections (Fig. 17.8).

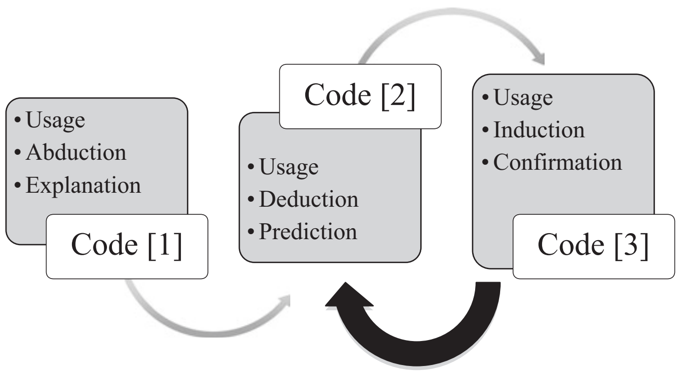

Fig. 17.8 The pragmatic, usage-based foundation of *Cybersemiotic Discourse Pragmatics* in *Paideia-poiesis*/*Meta-semiosis*

[79] It is a matter of discretion who considers himself to be a Master and who a Novice. In actual usage, we may find cases where a child corrects their parent if they feel that the parent (e.g. dialect speaking) does not conform to the norms as the child thinks they are or should be and strives to acquire (e.g. *received* norms).

There are three stages of linguistic Tradition: 1. the *abductive* stage where a Code [1] is proposed as a *hypothesis* to explain Usage (cf. Andersen 1973, 2017); 2. the *deductive* stage where this Code is used as a *procedure* (Code [2]) to test, on the level of Practice, the correctness of its consequences (Usage), either by abductively Understanding the Usage of others (does it correspond to my predicted Usage?), or by deductively Uttering Usage, to check the evaluation by the *Mitwelt* Models – *Critico-semiosis*; 3. the *inductive* upshot of the experimentation is the *conventionalization* of an ideal *declarative* Code [3], a Convention which only exists as a *virtual* dialect, to be actualized on the levels of Communion and Practice – *Idio-poiesis/Hypo-semiosis* (cf. black arrow). The Declarative Code (Dd) is a virtual community norm (Dd, *historical*), whereas the procedural Code is an individual's idiosynchronic Dialect (Ad, Bd: *functional*).

17.9.1 Hypothesis Formation (Abduction, Creativity, and Innovation)

We have just mentioned that Tradition is the significant layer in Language Gaming since it is here the Communicative Competence is in focus, as a *method*, with respect to its acquisition, learning/teaching, and intergenerational transmission in language history. It is important to remember that Language Gaming constitutes forms of living, and this means that it is integrated with sympractical activities, everyday undertakings, and in the case of Tradition, the sympractical activity is *socialization* in general. The first level within this layer of Tradition, *Hypothesis* (cf. Nubiola 2005), concerns the *hermeneutic* abduction of a dialect as an explanation of (or, responsible for) surrounding linguistic behavior (a corpus of Utterances, Da). It is just a *fallible*, provisional hypothesis to be tested by being applied in actual Practice, via the next, predictive-deductive level. Another kind of abduction is the *hypocritical proposal* for an innovation of the glosso-semiotic norms. A *legislator* (B) puts forward the innovation as *hypothetically* valid, waiting for the co-legislators' (A) acceptance, according as they pass the move or not, adopting it in novel usage in Practice. So, competence formation is not just acquisitional *re-creation* but also discourse-pragmatic *creation* (*Deonto-poiesis/Nomo-semiosis*).

17.9.2 Prediction and Testing (Deduction); Meta-Cybersemiosis

This deductive level is one of *Meta-practice* (meta-communication, Andersen 1989) where peripheral participation is legitimate in the *Community of Practice*. The language learner is allowed to make mistakes, to diverge from received Practice. The Models function as judges and law upholders/enforcers in *Critico-semiosis*. Thus, concurrent with the *object-level* Communion and Practice, a reflexive level of

Meta-cybersemiosis is operative (as a kind of third, or fourth, order cybernetics): When performing as a *hermeneutic* Subject, the Addressee both abduces the Message of the Addresser Cosubject and *at the same time* abduces the Code taken to be the target for the Addresser's productive Discourse Act. Conversely, the *hypocritic* Addresser Subject propagates his perception of the linguistic deontology by way of targeting it, and at the same time functions as his own *criticizer*, by being his own receiver in feedback. When the learner tries or tests his abduced norms by producing Discourse Acts according to them, he provisionally takes them for granted. And this provisionality of his abduced Code is the basis for its adaptability to a changing world. Thirdly, the *induction* operative in the *confirmation* of Conventionalization means re-use of *Socio-cybersemiosis*, since what is obtained is a virtual (modal) Norm (declarative grammar), which has to be *tokenized* as a *procedural* Norm to be operative and processed by the single Interlocutor's Mind.

17.9.3 Conventionalization (Induction); Idio-Poiesis/Hypo-Semiosis; Para-Poiesis/Peri-Semiosis

The result of the negotiations concerning the dialect "in force" is the inductive *conventionalization* of the valid Code on the collective *polis* level (D). As such, it is a *meta-norm* (type), a *declarative* grammar which does not function in itself but has to be operationalized to be able to re-enter and function on the previous, individual levels of Communion and Practice, as an *operative* norm (*procedural* grammar). This individual-society re-cycling dialectic is *Idio-poiesis/Hypo-semiosis*, where the individuals co-create their community (D) and their social, incl. linguistic, norms as abstract ideals (Dd) that are *tokenized* as procedural dialects, Ad and Bd (cf. List and Spiekermann 2013); see Table 17.11.

This return to the *individual* communicative *Interactants* (A, B) – *Idio-poiesis/Hypo-semiosis* – adds up to an *individual-centered social auto-poiesis*, however of second-order, and thus not of an organismal society, but a *Cybersemiotic Discourse Pragmatic* autopoiesis, the communicative Subjects' co-creation of Language Games (of *medial Contact* in Communion, of *Message* in Practice, and of *Code* in Tradition). I have previously described the whole THECC system as *para-poietic/peri-semiotic*, thereby meaning an evolutionary, synechistic, closed system. But I have also described it as bio-cultural, as an integration of biosemiotics and cultural semiotics. Do we also expect a feedback loop from culture to biology? I firmly believe so (cf. Andersen 2006; Laland et al. 2000). Let me explain. The biological level concerns genetics, the cultural level *memetics*. The biological

Table 17.11 From individuals to society and back again

	From Individuals to Society	From Society to Individuals
Cybernetic (poietic)	*Poli*-poiesis (A*B*C = D)	*Idio*-poiesis (Dd = Ad | Bd)
Semiotic	*Hypero*-semiosis	*Hypo*-semiosis

potentiality for linguistic communication is *geno-tone* ('language readiness'). On the *species* level there is the biological Human Language Faculty, a *geno-type* which is present in each single individual human being at birth as a *geno-token*. (The geno-type language is an inductive, *reproductive* conclusion of the integration of individual organisms' geno-token languages, and tokenized as each newborn organism's geno-token language.) On the cultural level, language is a *phenomenal* entity: 1. *potential*, hypothetical Code (in language acquisition): *pheno-tone*; 2. procedural token Code in language Communion and Practice: *pheno-token*; 3. declarative *pheno-type* Code, on the *community* level (D), to be internalized as the pheno-token Code, the processor of each single individual language user. The connection between biology and culture is that the *geno-token* language (universal laws of language), together with the surroundings (C), function as major premiss (and thereby constraints) in the cultural inheritance (abduction, Andersen 1973) of the operative *pheno-token* Code, on the basis of the interpretation of the linguistic experiences (phonetic textual output, Da) as interpersonal and referential message contents due to hermeneutic decoding of the Discourse behind the textual output produced by the community surroundings. The linguistic Practice produces or at least is correlated with non-linguistic, cultural and biological Sympractice some of which is source of natural selection and thereby of the evolution of the *geno-type* language. This means that, in addition to *polis* that humans construct (cultural niche, D), they also *thereby* construct or modify the ecological niche (*physis*; life conditions, Cc) that they live in (under) and adapt to.[80]

17.10 Conclusion

The present *Cybersemiotic Discourse Pragmatics* conceives of human communication as an integrated, holistic evolutionary system spanning evolutionary cognition and communication, thus the term *Total Human Evolutionary Cognition and Communication*. It is *cybernetic-semiotic* which places single individual biological organisms and their contributions at the active-creative platform. This means that it is based on individual biological background capacities which separate the organism from its surroundings (*conditions of living*) but at the same time construe, and thereby colonize these surroundings as homey *lifeworlds*, corresponding to inner mappings and modeling systems. A biological organism is primarily a sensory-motor *Agent* with a Central Nervous System as well as peripheral sensory-motor systems, which in confrontation with the outer surroundings create a consciousness

[80]The evolution of Representation and Mediation out of sensory-motor Presentation is by way of *exaptation* and *functional evolution* of the peripheral processing systems, articulation/audition and intention/conception. Furthermore, the evolution of the *phenomenal* language (*glosso-genesis*) involves the exaptation of the social Mind to a cultural, codal Mind: a locutionary lexico-grammar with, 1. expressional, 2. referential, and 3. contentive dimensions. It functions as a procedural processor (*Paradeigma*; with these three dimensions), whose entelechy is *Syntaxis* (with these three dimensions), resulting in produced texts (*Syntagma*; also three-dimensional).

and a memory (habit), superimposed on background capacities. The surroundings are not only perceptually triggering *evolutionary cognition* but also interactionally and conspecifically triggering *evolutionary communication*. Whereas the organism is private as regards biological and psychological functioning, it develops *intersubjectivity* in interaction with its conspecific surrounds. This means that evolutionary communication is exo-semiotic and sym-poietic, as against the biological and psychological auto-poieses. Evolutionary communication constructs a *public domain* – on the highest level, a *community of practice*. The individual and its lifeworld plus the *cultural* Signification Sphere of the community of practice constitute eco-semiological systems as units of selection in evolution. Evolution is continuous, *synechistic*, with *cybersemiotic transmutations* marking the transitional thresholds between the different levels/layers. Thus, a combined *anapoietic-intrasemiotic* transmutation creates a private, cognitive Mind. This cognitive Mind evolves into a *social* mind via a *catapoietic-metasemiotic* transmutation adding a *hypocritic-deductive* perspective to the *hermeneutic-abductive* one present in perception (inherited in discourse reception). In its turn, genetic communication develops into *memetic*, culturally transmitted communication (Language Gaming) via a *paideiapoietic-metasemiotic* transmutation. Being based on tradition and deontology (*deonto-poiesis/nomo-semiosis*), Language Gaming evinces a *methodeutic* legislational layer, where the norms are proposed, acquired, negotiated, and ultimately conventionalized. This is a metalingual layer placed on top of levels of communion and, centrally, linguistic ongoing practice. *Paideia-poiesis* operates on the basis of the cardinal activities of explanation (Abduction), prediction and testing (Deduction), and, finally, conventionalization (confirmation, Induction). A final point is that, in so far as linguistic practice and tradition co-occur in one and the same communication, as object-level communication and meta-level meta-communication, respectively, the linguistic practo-poiesis is a double one (involving *metalingual reflexivity*), thus the concept of *para-poiesis/peri-semiosis*. Since we accept the existence of a sym-poietic, *societal* domain, over and above the private domains, and also since we subscribe to an individualistic, organicist conception according to which only basic-level individuals can operate, we must postulate another transmutation of *idio-poiesis/hypo-semiosis*, whereby the would-be societal norms return to the individuals as actual, operative norms. In this way, first-order sociological *sym*-poiesis feeds back as second-order *social auto*-poiesis of the single individual. The model can be summarized as conforming to Peircean *agapistic* evolution of concrete reasonableness (Brier 2017a, 2017b), see Table 17.12.

Table 17.12 Summary of the *synechism* of *Total Human Evolutionary Cognition and Communication* in terms of Transmutations, whereby previous layers come to include later layers in a kind of *para-poietic/peri-semiotic* telescoping

Transmutations (THECC)	Body > Mind	> Social Mind	> Discourse	> Tradition	> Discourse (Reentry)
Para-poietic	Ana-poietic	Cata-poietic	Deonto-poietic	Paideia-poietic	Idio-poietic
Peri-semiotic	Intra-semiotic	Meta-semiotic	Nomo-semiotic	Meta-semiotic	Hypo-semiotic

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Chapter 18
The Cities and the Bodies As Cyberinterfaces

Lucia Santaella

Abstract Digital technologies have infiltrated in every corner of the metropolis, in our homes, workplaces and leisure centers, approaching our bodies with a "naturalized" intimacy. This means that both cities and bodies have been transformed into interconnected interfaces. This paper aims to investigate some of the details of this question in order to call attention to the potential for semiotic analysis that is implied in these human-machine interfaces.

Keywords Bodies · Cities · Sensors · Semiotics · Cybersemiotics · Digital

18.1 What Is an Interface

Since the emergence of personal computers, we have been dealing, in a rampant progression, with a paraphernalia of machinic devices. This has led us to acquire an intuitive understanding of the meaning of the word "interface". However, I learned from C. S. Peirce to practice the ethics of terminology, an ethic that instructs us to face the task of explicitly explaining the meaning – always cunning and covered by adventitious connotations – of the terms we use. Although it is an exercise that involves effort, implies time and the availability of our good will, it always seems necessary to avoid, from the outset, the mere chewing of clouds of words disguised in scientific discourse and the unnecessary misunderstandings that come from it.

"Interface" has become a keyword since the computer became a semiotic and dialoguing machine. If there is no interface, there is no interactivity, another keyword. In a generic and technical sense, interface is defined as environments that allow two or more systems to be mutually adapted. When two entities as distinct as machines and human beings are meant to enter into conversation, there must be semiotic resources on the surface of the former adaptable to the senses through which humans apprehend and respond to stimuli and appeals of the world. But this

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is not enough: given the dissimilarity between the two participants, the semiotic resources of the machine should be so friendly and inviting that they encourage humans to take action. Besides, the term "interface" is not limited to the relationship between machines and humans. There is also interface between the components of a machine, for example, between a video board and a motherboard that is called "mother" precisely because it can house multiple interfaces.

In the field of computing and informatics, the term "graphic interface" has become current to designate screens in which graphical representations with drawings, images, diagrams, signs, tracks, etc. are inscribed. These signs allow the user to interact with a program, thanks to other features such as mouse and keyboard, or finger touch which is nowadays more common. But the interface that the surface of the screen presents plays the role of a semiotic mediation to the programs that are in the machine brain. This means that we are not facing a common machine but an intelligent machine and that is why this kind of "conversation" begins to be stimulating and thought-provoking when compared to the tedious mechanical operations of driving a car that only ceases to be tedious when the speed triggers the adrenaline discharge in the driver's body, with all the dangers that result.

In order not to limit myself exclusively to computational interfaces and to move to other, often hybrid types of interfaces, especially when human beings are involved, in Poissant's careful article on the subject (2009, pp. 71–90, see also Johnson 1997), there is a presentation of six types of interfaces, most of them playing the role of indexical signs in an existential type of relationship between the signs and their objects. However, when digital processes are introduced the interfaces become more complex since they are based on legi-signs involving symbolic relations as follows.

(a) *Sensors* – according to the author, they go from microphones to data gloves, from the photoelectric spreadsheets to ultrasonic detectors. Sensors capture data of various types related to the environment. The analog and especially the digital sensors are multiple to capture strength, light, heat, movement, humidity, perspiration, including stress level, and serve as basic devices for interactivity between humans and the environment or between humans themselves. They function, therefore, in many cases, as extensions of our senses, and sometimes involve proprioception.
(b) *Recorders* – these range from cameras to mechanical phonographs and digital memory to "provide a sample of the reality or traits of an activity and fix it to a more or less reliable and durable medium. Unlike analogue technologies that fix light and sound waves, binary processing introduces the possibility of conversion to a numerical value (0/1) of sound samplings or kinetic images or images by means of video". Binarism also harbors the possibilities of analogue processing by adding all kinds of manipulation, combination and hybridization of sound and images through digital processes. With its transmission or recording interfaces, digital technology has become an interface to human creativity associated with the potential of the computer. Recording has become "a transformable memory, an extension of a mental faculty".

(c) *Actuators* – they include from pneumatic, hydraulic or electric devices, which allow the possibility of moving a robot or one of its parts to the muscular electrodes used in biotechnology. Some actuators mix memory-endowed materials, adapting the shapes of these materials to weather conditions, light, and so on. When they are "intelligent", materials can adopt an "attitude" about the environment and can, in turn, act on it. This is the typical case of a symbolic relation which is confirmed in a more complex dimension in the next items below.
(d) *Transmitters* – these extend from the telegraph to the Internet and telepresence. Beginning with the electric telegraph, the way was paved for a whole series of transmission interfaces (fax, television, teleportation, etc.). Telematics opened up new dimensions of time and space and introduced new types of presence (ranging from spectrum to clone), interventions (the first cyber coffee and telepresence) and interactions (networks and interactive television, etc.).
(e) *Diffusers* – they involve from magic lantern to high-definition interactive television, from street organs to digital acoustics. When the audiovisual transmission is considered, it passes through a projection screen connected to audio reproduction sources (electrostatic membranes). Flat screens (plasma, LCD, thermal image), projection screens (cinema, television), touch screen monitors and high definition televisions open the way to transmit image and sound, while adding samplings of reality. Diffusers also incorporate 2-D and 3-D representations that led to holographic video in their combination of holography and computer graphics.
(f) *Integrators* – these range from automation to cyborg. They seek to enhance the organic or to design artificial creatures through various interface integrations that attempt to reproduce the live. Located at the intersection of research in tissue culture engineering, nanotechnology, various types of prostheses and artificial life, they aim to "repair, perfect or redesign the human." The integration of technologies in the cyborg has advanced nowadays from the questions about body transformations to the discussion about the enhancement of the mind in artificial intelligence. From (a) to (f) there is a growing complexity in the semiotic dimension which goes from the mere existential relation of the index to the entirely symbolic relation which emulates the human semiotic potential.

In addition to presenting this valuable classification, the author concludes that the interfaces – mediators between two languages or two semiotic systems – have infiltrated everywhere. They are connecting or passing agents, "translation filters between humans and machines" that announce changes whose consequences are not yet fully discernible. If they were not discernible in 2009 when Poissant wrote her paper, today they are even more indiscernible given the speed of the technological advances that we are witnessing more recently with the internet of things and artificial intelligence. In any case, the multiplication of interfaces, which incorporate the most varied devices, is an irrefutable fact and its use is becoming more and more natural, more comfortable to the human senses, more intuitive, more intimate. This intimacy is a consequence of the new semiotic interfaces which exhibit fully intelligent actions.

Cranks and knobs are disappearing from our view. The menacing, terrifying monsters of Abel Gance's *Metropolis* (1927) and the hilarious horror of Charles Chaplin's *Modern Times* (1936) are nothing today but metaphorical and allegorical figurations of the mechanical age which the digital age engulfed, digested and transfigured. In the present state of affairs, the screens move toward full transparency with sensory and gestural interaction, as they appear in James Cameron's *Avatar* (2009). The prospect is that controls become invisible without polluting the body, the landscape and the living environment of a new cyborg with a perfectly "natural" appearance, but already transmuted by tiny molecule-sized chips that will inhabit the interiors of its body. In fact, the widespread invasion of visible and invisible interfaces is happening in a gradual and increasingly in a less blatant manner. The more technology infiltrates everywhere, the more it becomes invisible. The more effective the interface with the biological complexity of the human body, the more it becomes imperceptible. Perceiving the interface and the semiotic relations that it involves only interests the experts, engineers and designers when the interface malfunctions.

18.2 Interfaced Cities

In his book about *The city as interface. Digital media and the urban public sphere*, de Waal (2014) explains that, in urbanism theories, even before the cities have been populated by semiotic networks of urban sensors and hotspots mediating the dense webs of informational connections, interfaces were defined as ways in which citizens were able to adapt and to reconfigure the collective rhythms and practices and the logic of the urban communities of which they were parts. The author reminds Castells' (1989) relevant consideration that cities have always been communicative systems that are based on the interface of individuals with collective identities and shared social representations.

It is, therefore, the ability to organize materially these new interfaces in semiotic forms, rhythms, collective experience and communicable perception which makes cities to be sociability producers and creativity integrators, a sociability that could otherwise fall into destructiveness. The mechanisms of the urban public sphere, the theme of Waal's book, are places for the performance of social roles, for the encounter and confrontation of citizens and the formations of urban audiences. These mechanisms gain an extra layer of complexity thanks to the growing complexity of the signs that they involve. Thus, the urban public sphere is not confused with a "neutral stage" for the performance of the citizens' roles, since it itself plays an active role in this process. When individuals occupy or circulate in these spaces, they become familiar with their logic and rhythms. To face the complexity of these processes, in his research, de Waal raised four concepts, according to him, able to evince the semiotic functioning of the city as interface:

(a) *Platforms* – how the urban public sphere serves as a platform for meetings and clashes between citizens.
(b) *Programs* – how and by whom the public sphere is programmed. In a top down or bottom up way?
(c) *Filters* – which filter mechanisms are operative, who stays inside and who stays outside them?
(d) *Protocols* – how do protocols, which guide interaction in these places, emerge? Who strengthens them and who answers them?

After the advent of media technologies, the author adds, the use of the word "interface", which until then seemed to him to be metaphorical, became a literal term. It is no longer the physical public sphere that serves exclusively as a platform for performances and encounters, but now social networks are added to them in order to function as complementary platforms in which individuals can exercise their citizenship. The programs, filters of search engines, and smartphones embedded with georeferential devices, all together configure our everyday urban practices. Urban social values and ideals are codified in software, composing the protocols that govern these interfaces. All of these semiotic factors now play a role that has transformed the scenarios of previous urban interfaces. It is necessary that these scenarios enter the agenda of researchers of the human dynamics in urban environments that today are hyper equipped with technologies.

18.3 Cyborg Cities

One of the first researchers in Brazil to confront the topic of the cyborg city was André Lemos (2000, 2004). For the author, the city has always constituted itself as a "complex artifact composed of various material and spiritual networks (Saint Simon)." The present cities, however, have become "cyborg-cities". Taking as its starting point the sequence that goes from "urbanization that begins in the 19th century, matures into the modernization of the 20th century and establishes itself as a world-city in the post-industrial era", the author situates the cyborg city as the city of cyberculture", complemented by new telematic networks – and the technologies derived therefrom, fixed and wired internet, cell phones, satellites, etc. – added to the transport, energy, sanitation, lighting and communication networks". (2004, p. 133).

As Lemos says, "the city has always been a great artificial machine", a semiotic machine, we should add, with its hybrid and complex structures, which only grew with the emergence of the cyborg city, under the convergence of new technologies and information technology, which generated "the fusion, complexation and transformation of the classical urban structure, in the constitution of a new, electronic-digital paradigm." The cyborg city is defined as "the contemporary city permeated by spaces of planetary digital information flows and its various technologies connected by telematic networks. Issues such as virtual cities, e-government, cyber-citizenship, exclusion and digital inclusion, cyberdemocracy, all of them emerged from the cyborg-city, issues that are essential to understanding cyberculture in the twenty-first century (ibid., p. 131–133).

Already in 2000, Lemos did not fall into the equivocation of conceiving the spaces of flows and their virtual extensions as antagonistic to spaces of place, announcing and lamenting the death of distances and the end of cities. Having defined the space of flows as material organizations that allow simultaneous social practices without necessarily having a fixed territorial continuity, the cyborg city intensified the flows and its practices by introducing mutations in what the urban space is in itself, in its economic forms, in the exercise of politics, and in the constitution and transmission of culture, "which is leading mankind far from the preconceived, threatening and frightening" dissolution into virtual space" (ibid., p. 134). These and other prophecies dramatized by an impending catastrophe, in fact, have proven to be misleading especially thanks to the seamless connections between the physical and the virtual made possible by the explosion of "intimate technologies" such as mobile media and sensors.

The synchronous experience of a spatial mobile interface for still or moving bodies with the unmediated physical environment creates a hybrid spatial experience between the synthetic and the physical in a context of new forms of social, economic, political, and cultural interactions previously nonexistent. These are experiences that overflow the access to information and to the temporary, recombinant, open, multi-authoritative, interstitial, and arrhythmic communicative practices responsible for a frenzy cadence in the cacophony of the contemporary cyber-megacities.

18.4 Sentient and Smart Cities

Since the 1980s, computer scientists and engineers have been conducting research that was designed to embed computational intelligence into environments. These searches sought to go beyond the personal computer through ubiquitous computing in order to shift its processing to the periphery of our view. Small and inexpensive processors and wireless sensor networks began to spread the processing throughout the environment and become a reality for any citizens equipped with mobile equipment with processing capacity. In fact, at the same time, urban infrastructure, thanks to a semiotic web of interconnected sensors, became "capable of feeling and responding to the events and activities that transpire within the city. Imbued with the ability to remember, correlate and anticipate, "the city acquires the power to reflexively monitor environments and our behavior in them," becoming an active agent in the organization of everyday life in the urban public space "(Shepard 2011, p. 20, see also Santaella 2013, pp. 55–70; 2015). With this, the adjective "sentient" became euphemistic and the city began to acquire the status of intelligence, hence the name "smart city" now in vogue.

First of all, it is necessary to take into account that the sentient and intelligent cities have brought profound transformations to what we used to understand as urban spaces and public spaces. Although the physical spaces of the city have undergone few visible modifications, although buildings, parks, avenues, streets, houses, commercial enterprises remain apparently the same, there is much happening, new topologies emerging beyond visibility. This is the number one rule for understanding the meaning of an intelligent city, that is, a fully semiotic city. These new topologies have nothing to do with the traditional and still functioning subterranean systems of sewage, water, lighting, etc. It is true that when we move through the streets, parks, shopping malls, transportation we see a choreography, which we learn to get used to, played by people with cell phones in their ears, strumming frantically, or speaking apparently alone as their devices flee to an immediate view. However, these choreographies are only understandable when we go beyond the most obvious layers of visibility.

The power of such technologies evidently does not come from themselves, but from the fact that they function as access routes in a gigantic urban space. Information networks now surround us wherever we are. The environment is now immersed in pulsating invisible clouds of sensors and semiotic fluxes of information. Not only can we talk to people at a distance from hemispheres and oceans, but we can also access, with a few slight fingertips, immeasurable information networks. In addition, geolocated, location-sensitive mobile technologies allow us to navigate online through urban spaces, transforming them into moving points on a two-dimensional map, while experiencing the three-dimensionality of the spaces that we are moving in. In short, we live in a socially integrated and spatially contingent semiotic world. (Shepard 2011, p. 24).

However, there are no cities without being enlivened by the dynamics of the citizens who inhabit them, citizens who work, move, amuse themselves, and continually transform the city where they live. Let us turn our attention, therefore, to this side of the same coin, by examining the semiotic mutations that are also operating in the human bodies, in their extensions, mediations, and their resulting perceptual, cognitive, and behavioral implications.

18.5 The Body Beyond the Visible

Body issues have come into my preoccupations since I was drawn to the transformations that technologies were visibly introducing into biological bodies which, at that time (1998), I called "Technological Culture and the Biocybernetic Body." In 2003, in the midst of the effervescence of the digital revolution, these concerns became more mature due to the research I have carried out on the artistic practices that involve the various types of semiotic symbiosis of the body with technologies. These types led me to introduce the theme of the cyborg and to initiate the researches on the post-human, expression that already appeared in the title of the book (*Cultures and arts of the post-human*, 2003). In 2004, thanks to a bibliography already enriched in Brazil, especially by the work of Nizia Villaça (1998, 1999, 2001, and more recently 2011), in her approach to the body from philosophical and cultural points of view, I devoted an entire book to the theme of the body (2004). From then on, the question of the body reappeared several times in my work.

Although I have studied the body in the most varied aspects, philosophical, artistic, mediatic, psychoanalytic, only now the semiotic idea of the body as interface came into my mind, mainly because it seemed necessary to follow the theme of the city as interface in the counterpoint of the body also as an interface. After all, it is with the bodies that circulate in urban environments that the city is placed in interface, especially when both the cities and the bodies are surrounded by technologies that put them both at intersection. To begin the discussion of the body as an interface, one must consider the natural potential of human biological bodies for technological interfaces. This is because our bodies are already endowed with terminals that interface with the environment: our five senses, which are exteroceptive senses, plus proprioceptive and performatic senses. The human body, like that of any animal, is by its nature endowed with extremities which, in our case, are always some kind of hole (such as the mouth, eyes, nostrils and ears) or tiny holes (all pores of the body), which function as interfaces with the environment, directly linked to the brain and the interiors of the body. In close connection to this, we find the important semiotic notion of *Umwelt*, developed by the German biologist Jakob von Uexküll (1982).

The *Umwelt* is defined not merely as the physical and biological environment of an organism, but as a subjective world consisting of the specific perceptual field of that organism and the sphere of its practical interaction. Only the perceptual and operational factors of the environment form a significant *Umwelt* for the survival of an organism, an individual and, consequently, a community of individuals. This concept is applicable to all living organisms, but in the case of the human species, the *Umwelt* gains complexities due to the coevolution between its perceptive, mental and interactive faculties and the transformations imprinted on the environment, especially by the technologies adapted to the expansion of these faculties.

To be equipped with interfaces is necessary to human beings for the relative incorporation of external memory and its capabilities. But, once equipped, this incorporation is determined by both our biological heritage and the technologies that expand it. That is, in order to be efficient, the interfaces must be in tune with the modes of operation of human perception. The traditional visions of humanity conceived of our corporality as allegedly natural. In the post-human visions of mankind, the materiality of the body is inseparable from extensions and mediations that today culminate in the technological interfaces of the most varied types and which serve as intensifying and amplifying extensions of the natural semiotic potential of the senses and the mind.

I came to play in passing, but without stopping, in the theme of the body as an interface when, in 2004 (ibid., p. 53–64), I systematized the three vectors of incorporation of technologies into the biological body. The inside-out vector of the body, the interstitial vector, between the outside and the inside, and the vector from outside to inside of the body. The first one concerns the connections, or rather, interfaces adapted to human perceptual and cognitive abilities to access the gigantic world of digital data, through a swarm of devices ranging from laptops, cell phones, pagers, to telepresence, virtual reality, and so on. Such devices make it possible to move beyond the spatial limits, transporting the mind without the need to move the body. The second is interstitial, that is, it exhibits itself in its appearance, being located between the outside and the inside. These are the techniques of body building and body modification. The third comes from outside the body into it. These are implants and prostheses that aim to correct damaged organic functions, or extend them, transform them and even create new functions.

Both Lemos's text discussed above about the cyborg city and Poissant's text are examples of how important it is for us to climb the shoulders of those who preceded us when we want to thoroughly work on a subject. Poissant's text is not limited to the classification of interfaces and to present intelligent comments about them, but it goes on to analyze the functions of the interfaces in general and the role they play in the body interfaces. This brings us back to her text. According to the author, interfaces can be alternately extendable, enlightening, rehabilitating, filtering or synesthetic integration agents. In addition, these functions are not exclusive, they can occur together and an interface can fulfill more than one function. The essential role of interfaces is to achieve stable mediations between thought and matter, thought and sensitivity.

In their extensive role, interfaces prolong and increase a sense or more senses, allowing elements of reality, especially those enhanced with sensors, to be better captured and even recorded. Thus, the way is opened to other layers of reality, to other portions of matter and the universe previously inaccessible to humans. Let us take the telescope and the microscope to illustrate this paradigm: both open up worlds, allowing us to redefine ourselves. The first relativizes our position, the latter establishes a continuity between different kingdoms: animal, vegetable and mineral. Likewise, data gloves, sensor-activated clothing, and video cameras serve as "electronic organs" that extend the senses. Clothes with more complex functions are being studied in order to become sensors for recording body information and increasing exchanges with the environment.

All interfaces designed to serve as an extension of a faculty, memory, judgment or imagination must pass through the senses responsible for the interaction between humans and the environment. According to Poissant, this is in particular what happens to several interactive materials used in architecture that allow the exploration of unexpected relationships, no doubt always present, but which were not perceived and from which the technological interfaces lead us to participate. In fact, the architectural environments provided with sensors to capture the signals emitted by the bodies that occupy them and surround them, promote a symbiotic relationship between the architecture and its inhabitants. It is a relationship that is of interest, not only in the context of what has traditionally been considered the domain of the discipline of architecture, but it also interferes in all aspects of human-machine interfaces including the configuration of systems that serve the activation of cognitive processes.

For this, the interfaces need to take into account the ergonomic complexities that include the user's degree of sensitivity, the context of the use and the functionality of the interfaces in the ecology of housing, work, leisure and circulation environments in the urban world. In the past, each tool constituted its own ecology, implying a bodily scheme and a cultural context, which was far from requiring the examination of the scale and depth of its impact. Today, this cannot be ignored, otherwise the interface will not fulfill its role and be relegated to disuse. In fact, technological interfaces have made us more aware of our body, our modes of perception, the nature of the spaces in which we are inserted.

Concerning our hands of which several types of interfaces are dependent, Poissant explains that all research, which seeks to reproduce the 23 degrees of mechanical freedom of the hand, to simulate its actions in the context of a virtual environment, still faces numerous problems. One can imagine, then, how far we are still from the integration of all its various neurophysiological functions. Robotics, artificial intelligence, and all the movement sciences (kinetics, ergonomics, neurology) are interested in this. In other respects,

> there is a global rehabilitation of certain forms of sensoriality and in particular of the haptic function which the tradition of writing had, if not inhibited, at least relegated to the background, far beyond the hegemony of vision. The press and literacy have made the world a book to be read, favoring the abstraction and various formalizations embraced by science and the arts of the twentieth century. True research in the domain of interfaces, particularly in art, suggests that it is more about a reapplication of a 3-D world. We want to touch, feel, re-learn gestures, rediscover new forms of sensations, other layers of sensoriality and other dimensions of space (Poissant, ibid., p. 24).

Sensory domain research also aims to develop synesthesia. Artists and scientists explore devices that allow us to connect the senses of each other. Biofeedback facilities allow breathing and vision to merge through a device for visualizing brain waves. The creation of avatars with traits and characteristics of real people also opens perspectives previously untested in the computational interfaces. Thus, experiments can be done with sensations in areas that would otherwise be inaccessible. Avatars have an immunity that makes possible a sensory experience that could not be experienced in physical environments. The interest in interfaces that awaken other forms of sensoriality appears when one takes into account that the body presents itself as a semiotic source of information and incomparable delight. Tastes, colors and perfumes are associated with it. The encounter of chemistry and the cognitive sciences reveals more and more complex interconnections, modulating our adaptability and our mood. It is thus perceived that the body is much more than a mere envelope, a receptacle for the mind. It is itself the scene of multiple exchanges, devices of regulation and renewal that ensures adaptations (Poissant, ibid., p. 27).

18.6 Cities and Bodies in Symbiosis

The living, working, leisure, housing and circulation environments in the dynamic geographies of urban environments are now hyperequipped with technological interfaces that behave as extensions and amplifications of the body, perception, mobility, memory, mind, in sum, of human cognition, and of the interaction and conversation of humans with one another, besides now also with objects and environments sensitized and therefore sensitive. The city made up of interfaced spaces became an arena of ubiquitous information and performative actions performed by individuals extended and mediated by these interfaces. Cities and bodies became ubiquitous by the simple fact that they also became liquid. The ubiquitous invisibility of liquid informational spaces was adhered to the solid physicality of the cities and the living and dynamic bodies. This invisible, liquid, ubiquitous informational data have taken hold of the surface of the planet and surround us wherever we are. It is common to think that the data is in the cloud, but they come down to our hands and are available to our look at the touch of the fingers. This is bringing to twilight the traditional notions of space and time whose crisis the debates of postmodernity had, to some extent, anticipated. Today hypercomplex semiotic flows of urban and social hypermobility have been designated as hybrid cities, net cities, cyborg-city, cybercity, virtual city, city as interface, smart cities … What name will we give to urban environments that are already being dotted with spaces of augmented reality?

18.7 The Digital Universe and Cybersemiotics

There are many digital culture experts who find the seeds of this culture in the history of cybernetics until its development in second order cybernetics, especially in the theory of autopoiesis. When the area of cybersemiotics emerged in the 1990s and especially blossomed in publications under the tutelage of Søren Brier in the journal *Cybernetics and Human Knowing*, the digital revolution was just beginning. If we consider the speed and increasing complexity of this revolution, it is possible to evaluate how much the foundation of cybersemiotics was pioneering and prophetic, having reached its synthesis in the volume *Cybersemiotics* (Brier 2008). The purpose of this article was to select one of the fields, in this case the field of cybernetic interfaces, which may be able to exemplify and serve as a sample of the new horizons that digitalization, algorithms, the connectivity of sensors, RFID tags, etc. are opening up and claiming for semiotic analyses within the very properly called cybersemiotic area. In fact, the internet of things that brings with it questions about sentient objects, whose most appropriate name should be "semiotic objects," is becoming one of the fields in the cybernetic universe that demands to be investigated semiotically. The theory and the semiotic methodology, among the several existing ones, that is chosen for this task to be accomplished is not what matters most, for what is effectively fundamental is the recognition of the expansion of the area of cybersemiotics *pari passu* with the connective expansion of the digital universe.

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Index

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