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## **Second-order thinking, first-class reasoning**

Review article of Brier, S. (2008) *Cybersemiotics: Why Information is Not Enough!*, Toronto and London: University of Toronto Press.

Although driven by a Peircean biosemiotic perspective, at the centre of this remarkable volume, both physically and figuratively, is von Foerster's positing of 'second-order cybernetics', a systems theory which includes and considers the consequences of the existence of an observer. Søren Brier's extended discussion of second-order thinking is pre-figured in all that appears in the first part of the book while also overshadowing the second half. Yet, the book under review is not just a treatise on von Foerster. As this volume demonstrates, Brier is brilliant at cutting through and across disciplines, evacuating the verbiage of disciplinary paraphernalia, and projecting into the future, seeing what is needed for knowledge to progress rather than what might help further specialization or cause disciplines to perpetuate themselves. In his cybersemiotics he productively synthesizes not specialisms but generalisms, intellectual approaches that, on their own, have been branded, from the vantage point of the institutionalized bastion of specialization, as imperialistic attempts at providing a 'master discipline'. These generalisms include semiotics, (second-order) cybernetics (and Luhmann's systems theory), cognitive science, philosophy of science and biosemiotics. As well as forging the new field of cybersemiotics, the synthesis suggests radical change within the fields from which it draws.

This article will be concerned with the following areas that are surveyed, evaluated and re-animated in the volume: second-order thinking and the role of the

observer; the understanding of communication and information after Luhmann; and ethology, biosemiotics and autopoiesis. Yet, the fact that Brier refers to established and emergent fields should not lead one to imagine for a second that cybersemiotics offers nothing new. What is refreshing about this volume is the recurrence of at least four key themes, treated in a novel and quite urgent fashion, which encourage readers to see the world with rinsed out eyes. If one was forced to brutally pollard Brier's work, one would observe at the centre a pre-occupation with

1. the failure of all disciplines to recognize and adequately account for qualia;
2. the repression of arguments about motivation and its consequences in communication (and the slow progress made in understanding the role of emotions even by theories of embodiment);
3. the status of 'knowing' *contra* the computational information-processing paradigm;
4. the apprehension of reality after quantum theory, the notion of *Umwelt* and constructivism

One would also see a critical grasp of Brier's *maitres de penser*: Luhmann, Reventlow, von Foerster, Lakoff/Johnson, (Maturana/Varela and Wittgenstein in slightly lesser roles), and the special case of Peirce.

The volume's jacket contains a puff which I was very happy to give to University of Toronto Press after first reading the manuscript. There, I suggested that Brier's name will be spoken in the same breath as that of Wiener and Bateson. I might have added von Foerster to those names but, as I hope what follows suggests, cybersemiotics, if not supplanting second-order cybernetics, goes some way beyond it. For those who have limited time to read a positive review article, I should say now that this one, in effect, is an amplification of my puff on the jacket.

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## Preliminaries

Brier's stated goals alone in this volume reveal his ambition. It is not a book about 'pure' philosophy, despite the fact that it should have an impact on philosophy. Rather, it is "an attempt to conduct a constructive philosophy of science addressing an interdisciplinary scientific problem on the border of philosophy and science" (149). The reason for this is that the very notion of information science concerns epistemological and ontological assumptions. The well known problem of cognitive science's information processing paradigm is to do with the role of embodiment in cognition, understanding, and communication. Thus, cybersemiotics seeks to understand the role of the embodied mind in cognition and communication (4). Based on ethology and biosemiotics, Brier contends "that our cognition manifests itself as embodied semiosis motivated by biological, psychological, and social interests, which are powerful creators of structure and meaning in our spheres of signification" (310). The guiding ideas of information processing and rationality have had considerable purchase in philosophy and cognitive science; but *Cybersemiotics* is initially a lamentation on the fact that "There is no satisfactory theory of life and the inner world of first person experiences" (363). It sets itself the task of explaining qualia, life, and consciousness as emergent phenomena resulting from the evolution of material, energetic, and informational systems (23).

The way that the volume seeks to realize its goals is through a set of far-reaching connections between disciplines, perspectives and intellectual figures. For Brier, the self-referring autopoietic observer in second-order cybernetics is to be seen as a development of the biological understanding of Peirce's concept of the Interpretant, a development comprising the knower, the known and the process of knowing. In order to connect Peirce's semiotic philosophy to modern scientific understanding his Tychism is seen "as a further development of Prigogine and Stengers' discussion of the objectivity of chance" (100) and compatible in some ways

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with important aspects of the work of Maturana, von Foerster and Luhmann. The latter, especially, is called to account for his blind spot in relation to the concepts of 'person' and 'sign' (251). In consonance with the second-order orientation of thinking, the volume pits most perspectives against the ideas of pragmatic language philosophy or "linguaging" (Maturana; cf. Wittgenstein) and cognitive semantics (Lakoff and Johnson).

Amidst the wealth of reference in *Cybersemiotics*, though, there is one point that should not be missed. That is, the volume should be understood as a pivotal contribution to the epistemological break constituted by biosemiotics. Brier argues – rather persuasively - that cybernetic researchers made important progress and must be incorporated into modern biosemiotics (317). It is often forgotten that Sebeok made the same point about semiotics and its kinship with General Systems Theory, pointing out that Bertalanffy first presented his ideas in Morris's semiotic seminar in 1937 and observing, as Brier concurs, that information as communication and action is "always borne on a marker" (Sebeok 1977: 185).

In marrying second-order cybernetics and contemporary semiotics, as well as the many other things he does in this book, Brier offers 12 chapters plus an introduction (plus a Foreword by Marcel Danesi). Chapter 1 launches the critique of the information-processing paradigm and its role in a projected unified science. The second chapter is concerned with knowledge, particularly the 'objectivist' vs. 'internalist' versions of knowing. Chapter 3 introduces Brier's discussion of ethology and, in particular, Reventlow's empirical work leading to the observation of the phenomenon he calls 'rependium'. If you were in the lucky position of having a comprehensive knowledge of the numerous other topics that Brier discusses in this book, then, as I indicate below, this is the chapter that you would not wish to miss. Chapter 4 contains a discussion of Bateson on information in relation to the idea of autopoiesis. Chapter 5 is, as suggested above, the pivotal point in the book and features a cogent disquisition on von Foerster and second-order thinking. The sixth

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chapter is a detailed and stimulating discussion of Peirce. Chapter 7 discusses cognitive semantics and, in Chapter 8, the degree of synthesis in the volume becomes clear as the topics of *Umwelten*, animal communication, autopoiesis and Peircean biosemiotics are brought together. Chapter 9 stresses the *evolutionary* view central to cybersemiotics while Chapter 10 revisits, in cybersemiotic mode, the concepts of information, signification, cognition and communication. Chapter 11, seemingly disciplinary (rather than transdisciplinary) since it focuses on Library and Information Science, is surprisingly rewarding. Since it has much to say about both computation and the human ordering of knowledge (for now and the future), those who imagine that it will be about where to put books on shelves are particularly recommended to read it. The final chapter sets up a five-leveled cybersemiotic framework for the investigation of information, cognition and communication. In all, the volume amounts to 477 pages; these are liberally peppered with diagrams and figures which, in the main, do a good explicatory job.

### **The observer and second order**

Taking the 'cyber' in cybersemiotics, the crucial point is that it refers to second-order cybernetics – that is, the systems theory which follows the insights into the importance of factoring in the observer of all observations. Mainly associated with von Foerster (and, now, Brier), to the uninitiated the need to consider the observer of systems seems obscure. Yet, it is central to definitions of science and to the process of knowing. Von Foerster (1991: 65 – quoted on page 218) asks whether one is to consider oneself apart from the universe (“That is, whenever I look, I’m looking as through a peephole upon an unfolding universe”) or whether one is to consider oneself a *part* of the universe (“That is, whenever I act, I’m changing myself and the universe”). Put another way “Is the world the primary cause?” or “Is my experience the primary cause?” These matters, it seems, are undecidable; yet von Foerster welcomes such undecideability because it forces analysis to take into account the

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relational framework – the position of the observer – by which questions might become decidable. Those questions that are already decidable are always already in a relational framework – they have eliminated the need to consider the role of the observer because their decidability seems self-evident, their relational framework amounting simply to ‘the nature of things’. In recognizing this point, von Foerster does lean towards the conclusion that cognitive systems should actually be considered as part of the universe and that the vagaries of such systems should be seen as ‘primary causes’. The mode of observing and the mere existence of an observer – with all an observer’s impinging vicissitudes, psychological and physical – makes a difference to what constitutes observations. Brier notes that this is a “constructivist” worldview and “somewhat phenomenological” (219). Citing Spencer-Brown, he adds that it encourages a “start in the middle” in acquiring knowledge, “to begin with neither the subject nor object, but with the process of knowing within the project of living” (221). One might also add that it is a perspective conducive to anti-individualist investigations into cognitive activity. Fortuitously, second-order cybernetics, in forcing consideration of the observer, opens the way for ‘first-person experience’, a focus on agency – but not the ideological construct of individual will – in the process of knowing and the operation of systems. Cybersemiotics can be seen as the realizing of that project.

Lurking behind the concept of the second order, too, is the problematic equation of organic and machine activity, an equation that has dogged cybernetics and cognitive science. Brier quotes Sommerhoff on the reasons for the gulf between organism and machine being immense. In short, no machine has as yet been designed with the organic integration of self-regulation, self-reproduction, self-repair and self-maintenance (209). Second-order cybernetics is shown to be primarily a project concerned with “how cognition, information and communication arise from living systems’ self-organizing activity” and with the organization of lived realities or ‘Umwelten’ (209). To this end, von Foerster’s observations on trivial

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machines are introduced twice as he “delivers a fatal blow to the prevalent idea of an objective information science that a cognitive science can be built upon” (212). If an organism is to be viewed as a machine it is non-trivial for the reason that “A non-trivial machine is mathematically unpredictable because every time it runs a function it changes the state from which the function will run the next time. In this way the next run becomes unpredictable” (24). “Non-trivial machines change their state (way of computing) every time they comprehend a computation” (214). Not only do these observations introduce the observer as a meaningful entity in the composition of any world, they also bring into question those perspectives in science that repress or negate the observer in the fashion of Laplace. How can a brain scientist, asks von Foerster (quoted on page 210), develop a theory of the brain when the theory of the brain is written in such a fashion that it writes itself?

Following a path first trodden by Bateson, second-order cybernetics moved from “the objectivistic, denotative, and logical theories of information and language” and toward “more constructivist theories, going beyond social constructivism by moving into biology or even beginning with biology and moving from there towards sociology” (24). ‘Information’ is thus “something an observer notes as internally created in an autopoietic system and which has formed structural couplings in reaction to perturbations from the environment”. For Brier, then, second-order thinking is very much bound up with grasping that living systems (as opposed to machines) are self-creating and closed but are so in tandem with their environment; yet, as he writes, biological and cognitive functioning is still hampered by the vocabulary of information:

Von Foerster considered the nervous system as a closed functional system, because like Bateson he grasped that the real evolutionary and thinking system is the organism plus its cognitive domain, as Bateson pointed out. In his conceptual forerunner for biosemiotics Jakob von Uexküll called it

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Innenwelt and Umwelt. Maturana and Varela have, with their theory of autopoiesis, expressed the same phenomenon. According to them, living systems' connections to their environments, plus their mutual communicative connections, can be conceptualized as "structural couplings". These structural couplings organize the cognitive apparatus established through evolution. The "cognitive domain" is then the world of cognitive processes of a living system, and includes the totality of structural couplings. Maturana and Varela declare that everything in the organism is structurally dependent. Unfortunately, partly because they do not want to use the objectivist category of information, they continue to use cybernetic explanatory terms even when they speak about the living system's cognitive domain. But their idea of dependence is a non-deterministic mechanicism (24).

It is because of these problems of terminology that cybersemiotics seeks to reinvigorate cybernetics with the vocabulary and perspectives of ethology, 'languaging' and semiotics. Yet, more than equally, it should be remembered that this book demonstrates that "*Second-order cybernetics brings to semiotics the ideas of closure, structural couplings, interpenetration, and languaging*" (italics in original, 99).

If *Cybersemiotics* achieves the task of bringing second-order cybernetics and semiotics closer together, it has accomplished a great deal with two potentially resistant generalisms. On the one hand, as Brier points out, " researchers in autopoiesis theory and second-order cybernetics distance themselves from 'symbolism' and reference theories by thinking about analytical language philosophy, logical positivistic reference theory with empty logic symbols, or the like". These are worlds away from Peirce's semiotics. For Brier, where Peirce, von Foerster, and Maturana meet, is in the process of interpretation. Unfortunately, von Foerster, Luhmann, and Maturana use the concept of 'symbol' and do not reflect on

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signs. Typically, Luhmann tends to treat semiotics as an enemy to be kept at bay (probably because he conflates Peircean and Saussurean sign theory); Brier, diplomatically, notes that Luhmann's knowledge of Peirce, despite a 1993 essay on signs, is not profound (252). On the other side, despite Sebeok's comments of 1977 and elsewhere and biosemiotics' salute to the heritage of Bateson (see Hoffmeyer 2008a), semiotics has failed to tease out and exploit the commonalities between its own endeavour and that of systems theory. The reason that the meeting of the two fields is imperative is that *information is not enough* (!)

### **Information and communication after Luhmann**

Through Maclup's famous analysis of the concept of information Brier points to some of the – often unrealistic - expectations regarding the concept of information brought forth in both cybernetics and in cognitive science understandings of the term:

1. Information should be about something previously unknown.
2. Information should be about something barely known.
3. Information should affect the scope of, or the structure of, the receiver's knowledge.
4. Information must only consist of un-interpreted "raw" data.
5. Information should be useful.
6. Information can be used in decision-making.
7. Information should affect the receiver's possible actions.
8. Information should reduce the receiver's uncertainty.
9. Information should help to identify the contextual meaning of words
10. Information should change the receiver's acceptances/assumptions, especially as to the disposition of possibilities (for actions) (60)

Brier notes that each of them are limited and fail – even together - to capture the richness of cognitive operations. For in semiotics - in contrast - information is not a matter of quantifiable bits. On the other hand for information theory, the matter of signification is largely irrelevant (although Shannon [1948: 379] does concede its prevalence in communication). These are the fundamental differences that Brier delineates although, as will be seen, his characterization of semiotics as “based in human language’s meaningful communication” and as “phenomenological” (42) might be deemed unfortunate although, at this stage, he is largely introducing semiology to the uninitiated. The strategy that Brier suggests for dealing with these two fundamental differences in approaching information is sound: that is, the evacuation of the semantic, communicative connotation of the term, pointing to the foundational gestures of Wiener and Shannon and avoiding the ‘paradigm competition’ of information theory and semiotics (62). Yet, he does this, as will be mentioned briefly (cf. Copley 2010b), with reference to languaging and Wittgenstein rather than with signification and the history of semiotics.

Nevertheless, even with the evacuation of ‘meaning’ from information, taking information theory at its own word as being scientific and mathematical, Brier’s analysis of the matter is sufficiently illuminating in respect of information theory’s lacunae to make it worthwhile quoting his eleven objections in full:

1. Different information systems such as humans, machines, animals, and organizations process information in the same way. What is crucial is not the hardware but the software. What is essential are the algorithms in the program that process information. This is the central idea in the information-processing paradigm. It is often called functionalism, because it is the function, not the structure that is crucial.
2. Conscious logical thinking is generally taken as a model for cognitive processes. It does not consider intuitive and emotionally based sources

for cognition.

3. Understanding is viewed as classical-categorical. The analytical-categorical of classical set theory is emphasized.
4. Cognitive processes can be broken down into component parts and finally into a series of linear choices. Perception is primarily categorical and denotative (concrete description) and organized as classical sets.
5. Learning happens according to rules and principles and primarily according to the construction of structures of knowledge.
6. A language system is viewed primarily as a formal mechanism for transferring information via symbol manipulation between humans, machines and the human-machine.
7. The subject is primarily a cognitive subject, where embodiment and emotions play a minor role.
8. The cognitive subject is analogous to the computer.
9. The mechanism behind memory, the growth of meaning, and the handling and understanding of symbols is a so-called "semantic network". When one attempts to define the meaning of symbols and ideas lexically, this occurs with reference to other symbols and conceptions in a logical way. Meaning thus hangs within a network of mutually defined conceptions: a so-called "knowledge structure". The cognitive viewpoint is in this way very structural. This network is an effect of the aforementioned approaches and has a denotative and atomic character. It represents a formal entry into semantics. Put in another way, words are primarily context-free lexically described symbols.
10. The emphasis on the syntactic-structural aspect in cognition, thought, and communication leads to a decreased interest in the cultural-societal and historical dimensions of the meaning of human cognition and

communication. This clearly makes 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.

11. The meaning of language is primarily seen as the logical truth conditions of the mapping of the concepts of the contents of sentences upon the “natural things or kinds” of the world. This approach stresses logical analysis and the idea that meaning is captured by so-called truth conditions. Determination of truth tends to be based on a transcendental “God’s eye” view of knowledge (56-7).

All eleven of these points – with the possible exception of 5 - could be remedied or at least addressed by a semiotically inflected cognitive theory, the basis for which Brier is proposing in this book.

In his project of bringing together fields, however, one of Brier’s main targets for both praise and criticism is the work of Luhmann. The main feature of Luhmann’s work identified by Brier is that there are psychic as well as and social-communicative systems that are qualitatively different from the biological autopoietic systems identified by Maturana and Varela. For Brier, the systematization of the social that Luhmann’s critics have found so difficult to stomach because it seems to be such an assault on humanism, has certain advantages in spite of these problems because it demonstrates that communicative systems are autonomous, functionally closed and autopoietic (238). Thereby one must admit - whether one likes it or not – that Luhmann develops and extends the cybernetic and systemic thinking paradigm in what is presently the most advanced version extant in the realm of the ‘social’. It is true that Brier’s relation to Luhmann’s work is ambivalent – his criticisms of Luhmann are actually the core ideas of this book and will be considered below. Yet, what Brier finds congenial about Luhmann demands comment. Clearly, Luhmann

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proposes radical changes in the understandings of communication and information in the sphere of the social. "Communication", he writes,

is not at all what the commonly held view (and quite often the ill-considered scientific use) of this concept takes it to be, viz. a process of "transferring" meaning or information... it is a shared actualization of meaning that is able to inform at least one of the participants... The notion of such a "transfer" already runs into trouble by assuming the identity of what is to be transferred and thus that possession is relinquished when this transfer takes place, i.e., by assuming some form of zero sum. What remains identical in communication, however, is not a transmitted, but a common underlying meaning structure that allows the reciprocal regulation of surprises. That this meaning foundation is itself historical in nature, i.e., that it arises within the history of experience and communicative processes, is another matter altogether and does not contradict my thesis that communication does not transmit or transfer meaning, but rather requires it as pre-given and as forming a shared background against which informative surprises may be articulated (Luhmann 1990: 32, cited on page 331).

More pointedly, Luhmann states repeatedly that "only communication can communicate" (for example, 2002: 126), shifting the question of agency away from "people, individuals, subjects" or users back into the system or network that allows communication to take place.

Yet, the key issue for Brier, as for Luhmann, is that communication is carried out in systems that are operationally closed. Indeed, it is closure that guarantees agency. As Clarke and Hansen (2009: 1-2) state,

it is only by theorizing the operational closure of cognizing systems that cultural theory can rescue agency – albeit agency of a far more complex variety than that of traditional humanism – from being overrun by the technoscientific processes that are everywhere transforming the material world in which we live today.

This is because, as they add later, “a system is open to its environment in proportion to the complexity of its closure” (2009: 7). Entanglement with the environment correlates with systemic/organismic self-regulation – the complex closure involved in self-regulation is not a harbinger of autonomy or self-sufficiency but a necessary corollary of structural coupling (the term much used by Maturana and then Luhmann). So, a system like ‘the mind’ has operational closure but, in that state, must be open to the physiological processes of the brain; in turn, ‘the mind’, through its closure and because it is not simply the sum of physiological events, can gain knowledge of what goes on in the brain. These are arguments which have allowed Luhmann to investigate the structural coupling of different social systems.

Nevertheless, Brier qualifies and extends these arguments. Closure is a sufficiently important pre-condition of *Umwelten* and social-communicative systems for the theories of von Uexküll and Luhmann to be compatible; however, social-communicative systems, along with psychic systems, are not to be considered as truly autopoietic in the way that biological systems are (331). This may account for Humberto Maturana’s oft-noted reluctance to countenance the theory of autopoiesis beyond biology. What is important for Brier, though, is that

We construct for ourselves a “signification sphere” within which we live, and which we modify only if it is perturbed in a way that interests or threatens us. In a certain way we are monads, as Leibniz suggested in his monadology, each enclosed in our own self-organized world, as agreed by von Uexküll and

autopoiesis theory with its theory of the Multiverse and cognitive domains. We each consist of several closed systems such as the biological autopoiesis, the psychological organizational closure, and the social-communicative organizational closure (Luhmann 1990) that interpenetrate each other (335)

Luhmann hence allows a systems theoretical investigation of the social-communicative sphere and, to some extent, the psychic. Von Uexküll offers an account of closure at the level of species' relation to their environments. Yet, cybersemiotics demonstrates that while such frameworks might allow for agency, they have no way of accounting for the *quality* of that agency, the very feeling which might promote agency within the operation of systems. This is one of the most penetrating criticisms of Luhmann made by Fogh Kirkeby, as Brier notes (330). Yet, Fogh Kirkeby does not propose the comprehensive re-thinking that cybersemiotics does. The latter, crucially, reveals the blind spot of the teachings of Luhmann and his followers:

that there is no subject and no ontology of qualia and emotions in Luhmann's philosophical framework, although he sometimes imports them into his theory in their common sense meaning, which is somewhat inconsistent. But how do you relate the results of a theory that does not accept subjects and persons as real systems back into a political and juridical system that is based on persons with free will who are deemed responsible for their actions? (240).

Put another way, the work of Luhmann and others is savvy enough to embrace the idea, from von Foerster, that the enquirer or the observer is a crucial part of the process of observation. Yet, it is very reluctant to get its hands dirty with the raw material of first person experience.

Semiotics, by contrast, is, in principle, very willing to get dirt under its  
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fingernails. As employed by Brier, semiotics gets down to the nitty gritty – not through reification of phenomena into certainties but by at least seizing on what is neglected or taken for granted by other disciplines. On more than one occasion I have seen Brier give papers in which he states, while lifting an arm, that “we do not even know what it is that allows us to do this”, demonstrating at a stroke the relative poverty of biology, cognitive science, psychology and sociology. His point is that “we” *do* know that there are feelings and we *do* know that these *do not* come from nowhere and nothing, but not from where or how they can make our body move in accordance with our ‘will’. This is, again, a concept that has had no place in the natural, technical or informational sciences on which cognitive science is founded. Systems theory offers a great deal to the process of conceptualization; yet it has contributed very little to the understanding of representational processes, and nothing at all in respect of affective semiosis.

### **Qualia and motivation**

The experiential and phenomenal properties of perceptual and/or bodily experience – feelings, desires and thoughts are, as far as Peirce is concerned, signs. That is qualia – specifically qualisigns, which require a further sign to become manifest. They are the prerequisite for all cognition and communication. Certainly, Brier presents a forceful argument for their role in exposing the insipid flavour of uni-disciplinary reductionism:

Originally educated as a biologist, I have long been skeptical about research programs based on the belief that mechanicism could provide an adequate framework for the understanding of living systems. Furthermore, from a psychological and semiotic point of view it does not seem likely that theoretical understandings of the inner world of sensations, feelings, signification, and volition of living systems can emerge from mechanistic or

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functionalistic algorithmic thinking. A broader framework – both trans-disciplinary and non-reductionist – is therefore necessary (110).

For Brier, “The ability to have sense experiences and to be able to distinguish between qualitatively different ones (qualia) – sweet and sour, hot and cold, red and green – is basic to knowledge, understanding, communication, and intelligent reasoning” (38). Moreover, it must be the basis for any thinking through of the notion of the subject and subjectivity.

Of course, the frequently chosen mode of neglecting the concept of the subject has been to take it for granted or to treat subjectivity as straightforward. As Brier points out, in Luhmann’s focus on society as communication, the embodied mind is simply not theorized (242). Alternatively – if I may mention a parallel development - poststructuralism, which, since its inception with the work of Benveniste, has obsessed about the subject but bracketed out emotions in favour of a theory of the subject as constituted by power relations alone. Elsewhere, Brier has noted this by referring to “the linguistic or hermeneutic view” which has had its impact on the quest for knowledge and the objects of that quest, such that “All that is left is different forms and combinations of power and meaning games in a post-modern age” (2008: 35). Luhmann’s systems theory, like all cybernetics, has not been able to countenance the agency of subjects. Brier suggests that it was a possibility in Bertalanffy’s general system theory but even Bateson was then unable to build agentive action into his system. “Peirce at least has a theory”, writes Brier, and he sees this especially in Firstness, the realm of qualia (243). Spencer-Brown, too, in his embrace of “*observing as an important part of basic reality*” moved in the direction of qualia. Yet, what about more directed affect – that is, the difference between the potential of qualia and the set of combinations that make up motivation?

Running through cybersemiotics’ sign theory is an alert to a theme that has  
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sometimes been neglected in the mainstream of semiotics: *motivation*. Cybersemiotics extends 'motivation', away from linguistics (see Copley 2010b) and with reference, in particular, to ethology. Motivation

can be said to occupy the same position within ethology as the concept of life in biology, or that of the law of gravity and the attraction of masses in Newton's classical mechanics. In other words, it is an "occult" basic concept that cannot be explained within the paradigm, but that cannot be ignored either (156).

Citing (and translating) Madsen, Brier notes that psychoanalysis and American learning theory attempted to grasp motivation through the concept of 'trieb' or 'drive'. Yet, even these are too reductionist in their bearing to be able to encapsulate the notion of motivation. The problem is "immense complexity!" The complexity of neuro-physiological states, Brier notes, makes it necessary to always classify them with reference to some kind of *interest* or at least some point of view (157).

The elusive nature of motivation places it alongside qualia with reference to consciousness. Indeed, "Motivation seems to be an intention just below the level of consciousness" (345), an occurrence which von Uexküll attempted to build it into his theoretical framework as "tones" (a concept close to "affordances") but which corresponds to a range of investigations and theories about cognitive functions, from Freud's positing of the 'pre-conscious' to "the well known experiments showing that decisions of actions seem to be made on a level below consciousness, and a few seconds before we become aware of them" (428). For Brier, the departure point of these observations is Lakoff and the idea of extensions; motivation is argued to come from the embodied mind and is then used by linguistic communication as a structural coupling. Here, motivation relies on the conceptual

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system as a whole, rather than individual circumstances of cognitive categories (309). This is not a bad starting point but does not seem to be the best one for demonstrating the widespread embeddedness of motivation in cognition and communication. Rather than being immersed in the jargon of cognitive semantics, it would have been interesting to see what cybersemiotics makes of the work of Damasio, a potentially important thinker for both semiotics and cybernetics. *Descartes' Error*, for example, is dedicated *inter alia* to exploring how "The organism actively modifies itself so that . . . interfacing [with the environment] can take place as well as possible" (Damasio 1994: 225). This perspective, along with the layering of consciousness Damasio posits, would seem to fit nicely with the Luhmannian perspective in cybersemiotics, as well as the question of motivation, to attempt to fill the "explanatory gap" (1999: 9) that exists in neurobiology in relation to qualia. It would also fit in nicely with the account of Peirce given in cybersemiotics (see also Trout 2008).

### **Knowing and reality**

Where Damasio's work – close to ethological thinking but not explicitly naming it - famously re-orientates rationality as imbricated with, rather than divorced from, feeling and emotion, cybersemiotics re-casts knowing. It is partly in retreat from the "information-processing paradigm", but it is also critical of the reification of 'science' as an object (or subject). The starting point for investigation is, instead, "the process of knowing in living systems" (84); science, if it is based on a physicalist perspective, can never really grasp its own basis in knowledge (101). As such, then, cybersemiotics is precisely congruent with biosemiotics. Kull (2009) notes various distinctions between sciences but draws a general distinction between sciences that have a physical approach and study 'things', invoking universal laws, as opposed to those sciences with a semiotic approach which study knowing, invoking "local codes". This locality is echoed in Brier's observation that

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our knowledge is always contextual and therefore limited to a part of reality. We cannot even offer a simple description of the limits of the truth-content in our knowledge (models, theories) in any absolute theoretical way before practical testing and attempts at falsification. The border between the areas within which a given model determines to be true and untrue statements is not a smooth curve but a fractal one. When we try to generalize knowledge, it is always prone to failure (114).

The main threat of generalized knowledge, for Brier, is solipsism:

When I see the apple tree in the garden, I do not create it as such; I only create it in my world and give it social signification by fitting it into a recognized classification system. If we do not realize this, we could easily fall into a solipsistic idealism. The problem with solipsism is that it is a black hole. It sucks everything down into itself and denies the independent existence of other human beings with whom the observer/scientist develops language and explanations (195).

On the other hand, in spite of the second-order discourse and the emphasis on the role of the inquirer, it is a mistake

to propose a theory of knowledge one must dare to say more about the world than just that it is an infinitely deep, chaotic multiverse where we make structures by observing or acting. We must further theorize the processes of cognition and communication beyond their basis in the perturbation of and between closed systems to a theory of meaning (197).

Brier's frame of reference for these arguments, apart from philosophy of science, is cognitive semantics; for example observations on the view, associated with pure reason and a God's eye view of the world, that Lakoff (1987) calls 'objectivism' (264). The reason for this is that Brier sees Lakoff and Johnson as "pioneers" (297) in importing a modern biological perspective through cognitive semantics. The latter diverges from the idea that syntax is the root of meaning, opting instead for a pragmatic notion of basic level categories.

Again, there is a connection with biosemiotics. Since the basic level of Lakoff and Johnson is the level first understood and used by children, it is also the basis of language. This is consonant with Sebeok's developmental view, derived from Peirce but omnipresent in Sebeok's work and sketched late in his life in *The Forms of Meaning* (Sebeok and Danesi 2000). Sebeok's view of the intersection of natural human development and the role of culture is echoed in the Uexküllian musings of Brier inspired by Lakoff:

All human beings are equipped with the same cognitive apparatus and are grounded in the same embodiment, but the surrounding world determines the basic level because those surroundings determine what a culture defines as basic. A fisherman has a different understanding of what is the basic level than a peasant (302)

Brier's issue with cognitive semantics demonstrates not so much cognitive semantics' impoverishment as cybersemiotics' richness, particularly in respect of processes of knowing. He is disappointed that cognitive semantics does not draw on ethology, semiotics, or autopoiesis (297).

Yet there is a further perspective on knowing in cybersemiotics which is derived from von Foerster: constructivism. Brier lays out the arguments about reality whose theoretical and practical lacunae require a palliative:

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It does not make sense to claim that the world exists completely independently of us. But neither does it make sense to claim that it is the pure product of our explanations or conscious imagination (231).

It makes no sense to talk about reality without access to the operations that bring forth this result (Maturana 1990). (182).

*Since the rise of quantum mechanics and quantum field theory, science and common sense no longer have a word for the 'stuff' reality is made of (97).*

We cannot say that the world we live in has no structures, nor can we say that our process of knowing has no influence on these structures. We cannot claim that the world is basically logical and/or deterministic, nor that it is absolutely irrational and chaotic. We cannot say that reality is basically simple (and logical), nor that it is too complex to be even partially understood. We cannot claim that reality is basically 'dead' material, nor that it is basically 'pure spirit'. Our theory of knowledge and knowing must be located between these positions (205).

Of course, these polarities are not the only positions Brier identifies: there is the 'selfish gene' position or 'pure coincidence' (91), as well as the various forms of reductionism he identifies in the study of Psyche (subjective idealism, phenomenalism, and solipsism), the study of society (conventionalism, radical social constructivism that includes nature as a construction, and vulgar or mechanical historical materialism) and the study of nature (scientism, physicalism, and eliminative materialism) (135-6). He applauds the abandonment of the notion of 'objective reality' in second-order cybernetics, but does not give up on the idea that

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there is some “outside reality” (93). Thus he approaches the matter through Maturana’s question of the relationship between the observer and the observed. While noting the idea of the human being able to compute invariants – Eigenvalues, as von Foerster demonstrates – Brier also adds that material things “seem to force themselves upon us with independent necessity, no matter how we choose to perceive or ignore them” (182). Whereas for Maturana objects are constructed only in language, Brier does seem to concur with him regarding the bringing forth of a world of objects as co-ordinations of actions with which humans describe co-ordinations of action. Put another way, the object is not to be considered as individual or independent of the observer, but always as operative in a social domain.

Much theorizing about signs tends to be predicated on the idea that knowing is really rooted in the referential capacity of signification, particularly in respect of linguistic signs. Yet Brier is at pains to point out that knowing often operates at the level of linguistic inexpressibility – Polanyi’s ‘tacit knowledge’, for instance – and that a fair amount of reasoning is unconscious (see Figure 2.11 on page 134). Later, Brier ponders the point that the meaning of ‘Life, the universe and everything’ is precisely beyond words (148). Yet, the issue for cybersemiotics is that linguistic and non-linguistic signs contribute to knowing for the reason that in order to approach the question of knowing it is necessary to acknowledge “that our many knowledge systems cause us to explain, predict, and conduct activities in a ‘multiverse’, or ‘Umwelts’ as von Uexküll calls them, or ‘life worlds’ as the phenomenologists call them” (148). Yet, resorting to knowledge systems, implying many different realities, seems to be against the project that cybersemiotics is proposing and tantamount to relativism. Brier is alert enough to head this off, calling for a view “that is truly post-modern . . . abandoning the idea that any knowledge system has a direct way to obtain absolute truth on any matter . . . but still allows for a fairly reliable knowledge of a limited number of aspects and ranges of reality” (144). Reality, of course, is

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usually synonymous with ‘the real’ which, in turn, is synonymous with the ‘physical-material’; Brier rejects such a unitary conception of the real. He writes,

What we can measure inter-subjectively is a part of reality, meaning that it has an existence independent of the individual human being. But we do not know if this existence is completely independent of the existence of conscious beings. When science reifies this substance to be matter (devoid of life and mind, and subject only to mechanical and statistical laws) and creates a worldview where everything – including life and mind – comes into being through the self-organization of matter through evolution, this move is clearly self-contradictory. It leads to materialism and potentially to fundamentalism in the natural sciences, as evidenced by the term ‘universe’, which indicates that there is a single reality that is potentially fully comprehensible by science (199).

Put another way, the concept of ‘the real’ as ‘physical-material’ represses the process of knowing by which ‘the real’ can be said to be ‘the real’. *Knowing something* is not necessarily knowing *something in stasis*; hence, Brier insists on “a constructivism that goes beyond the social constructivism that takes nature for granted and as objective, and therefore is not able to incorporate a natural history of observing systems” (91). In this scenario, nature itself has to be considered as knowing and it should be no surprise, then, that cybersemiotics is so liberally dosed with insights from ethology which, arguably, has the ‘knowing’ of animals as its very *raison d’être*. Moreover, cybersemiotics is also an important current of biosemiotics by way of its cogent theorizing of agency in nature and the continuity of knowing.

### **Ethology, biosemiotics and autopoiesis**

For non-Danish speakers and for non-specialists in animal studies, the discussion of  
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ethology in this volume may yet be its most desirable feature. Not only did it force me to think more subtly about what I know of animal communication through my acquaintance with semiotics but it also introduced the work of Reventlow, a figure hitherto unfamiliar to me and no doubt to many others. An ethologist interested in phenomenological psychology and gestalt psychology, Reventlow's work is shown to be dovetailed with systems theory and cybernetics (165). The key concept that Brier analyses is the 'rependium', a sudden unexpected emergence of a structure from previous structures leading to a new, stable structure. Examples include the imprinting Lorenz discovered among ducklings and goslings, Reventlow's own discovery of the sudden changes affecting the stickleback in courtship and the realization of the route to food which dawned on Köhler's chimps. As Brier reveals, the rependium function presupposes mental ability (168): knowing on the part of the lowly stickleback subject to repeated stimuli. For him, it implies that motivation cannot be the simple physiological concept that it was for early ethologists; thus

Reventlow seems to be in the same difficult situation as Lorenz. Both begin their study of behavior as dualistic, where matter and mind are in two different worlds. But their evolutionary theory forces them into a theory of continuation between the mental capacities of humans and animals, and to consider mental awareness, emotions, and intentionality as having survival value (or else they would not exist). As is clear in ethology, Reventlow sees that the living system to some extent creates its own 'Umwelt' (168).

The idea of the organism's sensoria making its world and the idea of its agency in relation to other phenomena in *remaking* that world echoes both von Uexküll (perceptor and effector actions) and Maturana and Varela. At certain times, the environment can reorganize the organism's cognitive field into an 'aha-experience' that allows it to see its surroundings as meaningful (324). Brier notes the congruency

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of this idea with 'structural couplings' (cf. Luhmann), the connections that must be created between a system and its environment in order to systematically sense anything (325). At the same time, however, Reventlow was astute enough to point out the difficulty in gaining knowledge of the exterior world and getting a sense of the animal's perception of the world. Since neither can ever be gained in causal deterministic terms, there will always be an analytic leap by the observer (171). In Peircean terms, abduction – the observer's leap – is where, for Brier, semiotics and ethology meet, "because ethology – as well as gestalt psychology – investigates the subconscious abductive judgments and their development through evolution in the form of sign stimuli" (168).

Evolution was obviously at the forefront of ethology as it developed in the twentieth century. Yet, on the periphery of its research, arguably guiding its core, was "evolutionary epistemology". Brier sees in this the bases of realism, proceeding from the observation that species with the features which enable them to adapt and survive will have an efficient picture of their world. In his (effectively deconstructionist) reading of Lorenz, Brier shows how it was an issue with which Lorenz grappled, even as, at each turn, he tried to shrug off the shadow of his teacher, von Uexküll (313-4). In general, the discussion of ethology in this volume nicely demonstrates the way it moves inexorably towards semiotic principles while sometimes desperately trying to hold them at bay with the last vestiges of mechanism. At all stages, Brier brings out the "continuation between the mental capacities of humans and animals" and, indeed, the continuity of systemic principles across the realm of life. Reventlow's rependium is shown to map onto structural couplings which give rise to von Foerster's Eigenvalues coinciding with von Uexküll's observation in his *Funktionskreis* of objects arising in a stable interaction between the perceptual and motor parts of the nervous system (230). This continuity is of a piece with the biosemiotic project and is a major contribution to its as yet unsung cultural implications (see Copley 2010a, forthcoming). Brier writes,

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I know it blows a hole in much present day's sociological self-understanding that biology matters for signification, but biology and its genetic, evolutionary and ecological theory is as much a science as mathematics, physics and chemistry . . . biology is foundational for a theory of meaning and signification. That was what Tom Sebeok saw when he started biosemiotics! (226)

It is because of his belief in the implications of biosemiotics, in fact, that Brier is so critical of Luhmann. In retreat from biology whilst embracing principles from biologists, Luhmann focused on psychic and social-communicative systems as not primarily biological but autopoietic. Yet, as Brier argues, these can only function if based on a *biological* autopoietic system. "As a biologist and a biosemiotician", he adds, "I do not believe that Luhmann takes this fact seriously enough, and he therefore fails to develop a theory of embodied meaning, which is why I want to integrate his theory with biosemiotics" (237). That is good news for Luhmann studies, but what about biosemiotics? What does it have to gain from cybersemiotics?

In the main, biosemiotics gains from cybersemiotics the potential of an enlarged frame of reference and applicability. This might sound ridiculous given the breadth of embrace that biosemiotics exemplifies. However, I would argue that, thus far, biosemiotics has been pre-occupied with reforming 'mainstream science'. Of course, its tentacles have reached out to cognitive science fairly significantly. Yet it has not really concerned itself with psychic and social-communicative systems despite good fledgling biosemiotic thinking taking place in these realms. This is one point. Another is that its concern with signs rather than, say, molecules always has to be qualified – Brier argues that signs are fundamental parts of reality but they "are an Eigenvalue established through communication" (254). So, in those instances where nature is considered as a set of quasi-autonomous signs in growth –

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the example of the pansemiotic tendencies in Merrell's work and Emmeche's critique of him is given (357) – there is a need to pull back and look at the processes of observation in determining signs and the systems in which they operate, particularly in relation to the self-organization and self-making of those systems. The latter are not to be considered autonomous or made up of autonomous signs evading sociality, an argument Maturana would make:

The argument is as follows: when one realizes that there is no objective reality for any autopoietic (biological) system, then there is no objective reality for us or for science. We have to put objectivity in parentheses. There are no autopoietic systems without an observer who 'brings them forth'. This means that no theory can refer to objective reality to legitimize its claims of truth (180).

The point is telling, but Brier criticizes Maturana for excessive reliance on constructivism. In introducing the orientation towards observation into biosemiotics, Brier is not averse to criticizing those who have inspired him along the way. Along with Maturana, Luhmann, as already noted, is brought to book, as are Maturana and Varela, with their notion of the 'multiverse' - created through observation and acts, on the one hand, alongside, on the other, their admission of the biological body and life as real (180). Taking a route that poststructuralism opened up after Heidegger but was too frightened to tread except with anthropocentric armour, Brier, echoing von Foerster, notes that as observers "we are always already a part of the world when we begin to describe it" and, further, "From both a biological and psychological point of view one can then add that a great part of our communication and thinking is not of our own (self-conscious) doing; rather, it is biological evolution and cultural history that signifies through us" (254). This seems, to me, a useful way of re-framing for psychic and social-

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communicative systems the principles of downward causation and (biological) continuity. The latter, of course, was broached in the guise of 'synechism' by Peirce.

### **Peirce**

Although the observer and von Foerster are pivotal in this book, the figure that underpins all the discussion is Charles Sanders Peirce. His synechism, stated simply as

The present writer holds that in advance of positive knowledge, the presumption ought to be that there is such a unity in the universe that the difference between mental and natural phenomena is only a difference of degree. Presumably, the same elements are in both, and if so, there is no essential difference in their intelligibility (CP 7.463 cited on page 267 of the volume under review)

runs through both cybersemiotics and biosemiotics. Thus "Peircean semiotics", writes Brier, focusing on the principle of continuity,

breaks with the traditional dualistic epistemological problem of first-order science by framing its basic concept of cognition, signification through abduction, within a triadic semiotic philosophy, which is integrated into a theory of continuity between mind and matter (Synechism) where the three basic categories (Firstness, Secondness and Thirdness) are not only inside the perceiver's mind, but also in the nature perceived. This is connected to the second important ontological belief in Peirce's philosophy, namely, Tychism, that sees chance and chaos with a tendency to take habits as basic characteristics of Firstness leading into an evolutionary theory of mind (Agapism), where mind has a tendency to form habits in nature. Chaos and

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chance is seen as a First, which is not to be explained further (for instance, by regularities). It is the basis of habit forming and evolution. The chaos of Firstness is not seen as the lack of law, as it is in mechanicism and rationalism, but as something full of potential qualities to be manifested individually in Secondness and as general habits and knowledge in dynamic objects and semiosis in Thirdness (Peirce 1992). Matter and mind are united in the continuum of Firstness and develop through “evolutionary law” into Secondness’ manifestations of resistance, force, dualistic concreteness, and the impenetrability of objects. Secondness provides what second-order cybernetics sees as constraints on perception and cognition occurring in semiosis – Thirdness of true triadic sign processes. This is the deep foundation of Peirce’s pragmatism. As a result of the innovative work of Thomas Sebeok, Peirce’s semiotics is now interpreted as covering all living signifying systems in biosemiotics (355).

Continuity of matter and mind is no small issue. Yet cybersemiotics’ instatement of Peirce as the pivot of biosemiotics and second-order cybernetics rests also on specific issues in semiosis. The potential of Firstness – the realm of the fundamentals of first-person experience, affect and qualia – and its transformation in Secondness suffuse the processes of the plant and animal worlds as they are observed. As Brier points out, Secondness is not only the fixing of relations but also the enactment of constraints. The very Secondness of natural phenomena is what von Foerster would consider their “decidability”; in turn, this requires consideration of the frame in which phenomena are to be taken as “decidable”. That frame seems to be offered, in its most cogent form, by Peirce’s semiotics.

In addition to its potential to unravel the problem of decidability, the strengths of Peirce’s work for cybersemiotics are shown to reside in:

- matter being seen as possessing an inner aspect of living feeling (effete mind) (27); a hylozoistic view which Peirce shares with Aristotle;
- qualia and mind being installed in his metaphysics from the beginning (363); a rare philosophy of first person experience;
- Peirce's work being close to organicism and general systems theory (100); a point implied by Sebeok in 1977, see above;
- the conception of pure chance as living spontaneity with a tendency to take habits (29); a point which links both biosemiotics and second-order cybernetics;
- the fact that an interpretant, and therefore a sign process, must be established to create signification (32); an emphasis, therefore on process rather than objective information (cf. Bateson, Maturana, Luhmann);

More pointed, still, though, is Brier's mapping of Peirce's categories onto second-order cybernetic concepts. Secondness, he says, is the first distinction made by an observer marked by a primary sign, the Representamen. "The observer is Peirce's Interpretant that belongs to Thirdness. Only through this triadic semiosis can cognition be created. To become information, differences must be seen as signs for the observer. This happens when they become internally developed Interpretants" (96). In fact, this is an object lesson in the kind of interdisciplinary gymnastics that this book is so good at but which are difficult to actually put into operation.

In general, however, it is fairly easy to see how Peirce's comprehensiveness as a thinker has been appealing to those, such as Brier, battling reductionist science. He demonstrates a catholic embrace of phenomena whilst promoting rigour; his *Signs* vol. 3: pp. 69-107, 2010

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concepts inculcate flexibility while being useful in their own terms; but, above all, his thinking is evolutionary and envisages continuity across the known universe. The other thing for Brier is that even in his most fundamental categories – Firstness, Secondness and Thirdness – Peirce emphasizes semiotic qualities “working over space-time magnitudes so immense that they are beyond human comprehension” (351). As a result, there is attention in Peirce’s philosophy and method to the fact that qualia probably potentially exist from a very early stage in life but require a nervous system to achieve their full manifestations. They are part of the real rather than creations of the mind, affording cybersemiotics a perspective that is both realist and attentive to first-person experience. Brier sums up by noting that Firstness includes all known qualities (such as blue, hardness, sweetness). These qualities manifest themselves as ‘thing-ness’ and to be such they must be interpreted by a system that can recognize them as signs or habits or regularities. Eigenvalues, in von Foerster’s terms, established by structural couplings of autopoietic systems, correspond at least to part of what Peirce calls the Interpretant: the signs in the minds. These are the bases for those signs and regularities that are real and which connect Nature and Mind. They are bases which “exist only as potentials in a sea of spontaneously complex dynamics, including emotions, basic qualities, and mathematical forms”. As such, like cybersemiotics Peirce proposes an evolutionary science cognizant of these potentials, finding patterns and dynamic modes or habits, “a science of the habits of evolution and the meaning they come to have for the living systems created in the process” (274-5). Put another way, it is a science devoted to investigating knowing rather than producing eternal laws. This is precisely what cybersemiotics is seeking to promulgate.

## **Conclusion**

I have just two caveats regarding Brier's account of cybersemiotics – they are the features of the volume that I will note here but will expand on at a later date (see Cobley 2010b). These are the topics of 'languaging' and 'religion as knowing'. The first runs through the volume and demands brief comment. The second is only implicit. As regards 'languaging', Brier is usually referring to two phenomena with this term: the pragmatics of situations as they are constructed in signs about them; the specific 'sign games' (cf. Wittgenstein) which develop in such situations. There is no problem with this general notion: it demonstrates the contextual and dynamic bearing of cybersemiotics. Nevertheless, the terminology is confusing and derivation from Maturana, who seems to have had considerably less than Brier to say about the matter, is frustrating. The imprecision of 'languaging' as a term regrettably blurs some of the semiotic points that cybersemiotics is trying to make about the processes of human communication and cognition. Equally problematic are the mentions of religion in relation to knowing. This volume, long though it is, points to a huge further discussion regarding the practices that humans currently have which amount to knowing. Brier mentions the sciences, art, religion and politics/ideology (141). Why this list and not another one? Can all these practices be subsumed under the category of knowing? I tend to think that religion cannot and I am a bit dubious about art and politics. That Brier is cautious, too, is demonstrated in his publications appearing after this volume was published (e.g. Brier 2010). Is it possible to re-define knowing without losing cybersemiotics? Is it possible to re-define what these practices do without losing the connection to knowing? These will be part of the ongoing debate that cybersemiotics provokes. For now, it is worth considering what cybersemiotics has already done.

Cybersemiotics is a theory of information, cognition and communication. In itself, that is not new. Yet it is a truly transdisciplinary theory. Brier has had a training in science but knows the philosophy of science. This volume evinces a background in cognitive science but has a comprehensive grasp of the extensive

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sociological work of Luhmann. It is underpinned by the already transdisciplinary orientation of cybernetics and systems theory but is also fully informed by a deep reading of Peirce's voluminous work in philosophy and logic. It draws on principles from linguistics that have been introduced by pragmatics and from cognitive semantics. Its discussion of biology, as befits Brier's background, ranges over not just the history of ethology but also the ultra-theoretical work of Maturana and Varela and the groundbreaking findings of biosemiotics. Brier's grasp of these areas is such that he does not shrink from criticizing the shortcomings of any of the above.

The critique in *Cybersemiotics*, coupled with its proposals for a transdisciplinary vision, compels readers to view life, consciousness and cultural meaning as constituted by the continuities of nature and evolution. It challenges physicalist science, with its ideal of third person knowledge, replacing it with an imperative to consider first person embodied consciousness. Likewise, evolutionary biology, with its thermo-dynamic bent, reliance on the idea of genes as mechanisms and its fixation on ideal empirical objects, is shown to be stifling its potential all the time that it does not develop a theory of meaning and agency in nature. Following Uexküll, cybersemiotics does maintain a conception of the real which is beyond meaning and agency. Yet, unlike much contemporary cultural analysis or constructivism which sees knowledge as constructions and plays of language and power – cybersemiotics is predicated on embodied first person consciousness in relation to nature as continuous over plant and animal existence. It has no need to rely on the 'culturalist subject' whose world is supposedly a discursively constructed phantasm. In this way, cybersemiotics is 'phaneroscopic', philosophically speaking: it puts the first person point of view in the foreground, proceeding from meaningful experiences (for example, qualia) before positing an opposed, exclusive subject and object as the basis for knowledge. In this Brier is really Peircean: unlike those, including quite a few Peirce scholars, who focus almost solely on Thirdness, cybersemiotics takes Firstness as a realm of experience very seriously indeed.

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More specifically, *Cybersemiotics* promotes a new perspective, carries out new syntheses and demonstrates congruencies which should all contribute to knowledge. Its thesis regarding the observer and second order thinking will hopefully spread out from systems theory to the sciences, social sciences and humanities, particularly in respect of how the idea of 'information' is used. 'First person experience' will hopefully be a concept which seeps into thinking across disciplines and, especially, among those who eschew the concept of individualism without wishing to underestimate the importance of affect to people. Certainly, theorizing qualia in semiotics is crucial; as is the re-thinking of motivation – never a purely linguistic phenomenon - after cognitive science. In that sphere of knowing 'beyond' qualia, cybersemiotics' synthesis is illuminating because of its mapping of Eigenvalues, generated by the process of the structural coupling that is unique to autopoiesis, onto the Interpretant as a 'sign in our mind'. Closure and autopoiesis contribute an understanding of the inner world of the organism (and, consequently first-person views) as continuous with matter. The same project of registering continuity is characteristic of (Peircean) biosemiotics. Effectively, as Brier shows, Peircean biosemiotics offers a theory of mind and meaning to the notion of cognition inherent in second-order cybernetics and autopoiesis. Meanwhile, second-order cybernetics offers biosemiotics a way to theorize the systematization of cognition whilst enhancing biosemiotics' orientation to knowing, honing the understanding of the role of the observer in cognition, and negotiating constructivism and realism to help clarify the understanding of the agency of organisms within *Umwelten*.

Organism, environment, cognition, signs and reality – none of them issues to be settled by one discipline. A consummate transdisciplinary, the last word is probably best left to Brier:

As second-order cybernetics takes systems science and cybernetics to a new  
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level by including the observer, biosemiotics takes semiotics to a new level by including all living systems in semiosis. They both take this step through a bio-constructivism, where they see all living systems constructing their own “life-world”. In biosemiotics it is often called ‘Umwelt’ from von Uexküll’s work. Maturana speaks of the organisms’ ‘cognitive domain’. Von Foerster sees a cognitive world constructed of ‘Eigenvalues’ of the nervous system’s cognitive processes . . . In all these systems of thought the bio-constructive view leads to an idea of “closure”. The term is mostly used in connection with autopoiesis, but both von Foerster and von Uexküll have clear indications that the “life world” — or “signification sphere” as I call it — is all there is for an organism. They all agree that there is no stream of “information” from the environment going directly into the cognitive system of the organism that can be picked up and give a more or less ‘objective’ picture of the ‘real environment’. But all acknowledge that ‘reality’ or ‘the environment’ is to be viewed as some kind of limit that puts ‘constraint’ on the possible ways an organism can exist as an individual. Von Foerster is most explicit around accepting that the environment has to have energy and structure, and von Uexküll also seems to accept some kind of real world outside the many Umwelts, since he calls these ‘subjective worlds’. They all agree that life and cognition are two sides of the same thing. Peirce and Sebeok use the term ‘semiosis’ and ‘signification’ for cognition. But broadly speaking they are all talking about perception and cognition (339-42).

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