Preface

A Stroll Through the Worlds of Science and Signs

Having spent the last ten years in regular correspondence with the world's small but steadily growing population of "biosemioticians," I feel warranted in saying of this diverse group of molecular biologists, neuroscientists, zoologists, anthropologists, psychologists and philosophers: that while each one more or less found their way into this common project alone – proceeding from vastly different starting points and through drastically varying routes – it might yet not be too broad a claim to say that a growing discontent with what was being offered as (or in lieu of) "explanation" regarding the nature of empirically observed, real-world sign processes in their respective fields of origin appears to be the single most common impetus setting the majority of these researchers on their respective paths to what has now converged to become the growing interdisciplinary project of *biosemiotics*. Accordingly, on the website of the International Society for Biosemiotic Studies that I maintain at www.biosemiotics.org, I define the interdisciplinary research agenda of biosemiotics as follows:

"Biosemiotics is the study of the myriad forms of communication and signification observable both within and between living systems. It is thus the study of representation, meaning, sense, and the biological significance of *sign processes* – from intercellular signaling processes to animal display behavior to human semiotic artifacts such as language and abstract symbolic thought. Such sign processes appear ubiquitously in the literature on biological systems. Up until very recently, however, it had been implicitly assumed that the use of terms such as *message, signal, code,* and *sign* with respect to non-linguistic biological processes was ultimately metaphoric, and that such terms could someday effectively be reduced to the mere chemical and physical interactions underlying such processes. As the prospects for such a reduction become increasingly untenable, even in theory, the interdisciplinary research project of biosemiotics is attempting to re-open the dialogue across the life sciences – as well as between the life sciences and the humanities – regarding what, precisely, such ineliminable terms as *representation, sign of,* and *meaning* might

refer to in the context of living, interactive, complex adaptive systems" (Favareau 2005: o.l).[1,2]

Indeed, my own entry into this field came as the result of my growing discontent with the inability of cognitive neuroscience to confront issues of experiential "meaning" at the same level that it was so successful in, and manifestly committed to, studying the mechanics of those very same electro-chemical transmission events by which such meanings were being asserted (but not explained) to be produced. Indeed, the 1990s were declared to be "The Decade of the Brain" in the United States – and reservations about the seriousness of such self-aggrandizing hyperbole aside, however, this period did indeed see a great explosion of ideas and energy emanating out of such newly minted hybrid research projects as neurophilosophy, evolutionary psychology, dynamic systems theory, cognitive neuroscience, and Artificial Intelligence/Artificial Life.

What intrigued me about this research then (and now) was the fact that at the heart of these disparate research projects lay the primordial scientific question: *"What is the relation between mental experience, biological organization, and the law-like processes of inanimate matter?"*. However, and for reasons that should become clear as this history progresses, that ancient and comprehensively articulated question progressively became re-formulated – and ultimately replaced – by the much narrower and more presumption-driven question: *"How does the human brain produce the mind?"*. And this is a very different question – making some very different assumptions – from the prior formulation, as we soon shall see.

However, even in response to this perhaps less optimally formulated latter question, many interesting analyses were made, hypotheses proposed and theories advanced – though none proved fully satisfactory, even on the theoretical level, and as the inquiry began taking on its institutionally funded form, fewer and fewer of the major participants in the debate took the opportunity to reflect publicly on whether the question of "How do brains produce minds?" was not itself framed in such a way that there could never be provided a satisfactory answer.

For with the object of study itself being conceptualized either in a modified Cartesian sense (i.e., "mind" as an immaterial system property either emergently produced by, or actually reducible to, the activity of an material brain), or as an "inherently unknowable" phenomenon (McGinn 1999), or as outright category mistake of "folk psychology" (Churchland 1984), it's hard to see how any progress *could* be made on this issue, given the artificially barren parameters within which the search was set.

Towards the end of the century, the application of dynamic systems theory to neuroscience was promising to open up a third alternative to the "dualist-and-immaterialist versus reductionist-and-determinist" impasse, and several visionary brain researchers (e.g. Edelman 1992, Damasio 1994, Freeman 2000, Llinás 2001,

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[1] The abbreviation "o.l." stands for "online" throughout this volume.

[2] The reference list for this section appears in the back of the volume, to maintain consistency with the rest of the editorial material that introduces each reading.

Fuster 2003) were suggesting interesting syntheses that, although not phrased as such by their proponents, attempted to preserve the interdependent reality of both sign relations and material relations in their explications of the phenomenon of "mind."

However, the majority of these searches still proceeded from the yet too partial understanding that somehow "the human mind produces sign relations" – and it was not until neuroscientist and bio-anthropologist Terrence Deacon (1997) suggested a new way of looking at the problem of language origins through the lens of Charles S. Peirce's architectonic of "sign relations" per se that it became clear at least to some people, myself included, that a potentially more viable approach to the conventional mind-brain question might be to *not* begin that study by using the uniquely human manifestation of mental experience as the archetypal example of the system needing explanation, as if it – alone among the products of the natural world – somehow arose *ex nihilo* and persists today *sui generis* – but to inquire first, instead, into the far more fundamental relationship of all purposive organisms to subjective experience (a term which itself, it turns out, denotes a far broader set of natural relations and phenomena than are indicated when one begins a priori with the stipulation that "subjective experience" is something that arises wholly out of, and remains forever locked away within, brains).

Coming upon Deacon's provocative synthesis of Peirce re-set the fundamental terms of inquiry for me, and soon led me to discover the work of Danish biosemiotician Jesper Hoffmeyer – and it is from this point that I date my own decision to become part of the yet nascent interdiscipline of biosemiotics. To this day, I can still recall the precise moment of my casting of this die. I had only gotten as far as page 40 in Hoffmeyer's (1996) *Signs of Meaning in the Universe* when I came upon a passage wherein he compares the concept of self-reference in a system with the perpetual creation of "a map which is so detailed that the cartographer and the map that he is making are swept up into it." This elegant little description so perfectly captured the paradox that most contemporary neuroscientific theory both entailed and yet was simultaneously denying and/or attempting to run away from, that at the end of my reading of that passage – one of many such delightful asides ornamenting the profound and seriously consequential ideas argued for in this book, I e-mailed Jesper Hoffmeyer in Copenhagen, and found myself in Denmark a few weeks later debating the relations between intersubjectivity and mirror neurons at the First Annual International Gatherings in Biosemiotics conference.

Researchers from eighteen different countries were present at that inaugural *Gatherings* conference, with backgrounds ranging from physics and molecular biology to animal ethology, robotics, evolutionary psychology and philosophy of semiotics and of mind. Since entering the interdisciplinary project that this group was in the process of creating, I have learned much about the understandings attained by the various disciplines from which each of my colleagues has been informed – as well as about the longer tradition of "theoretical biology" that remains relatively, and detrimentally, untaught as part of a scientific education in the United States.

The book that you now hold in your hands has been prepared precisely as a resource for this addressing this lacuna. Like any other such anthology, it does not pretend to completeness – absent from representation here, for example, are whole canons of seminally influential work in physical science (e.g., Schrödinger, Heisenberg, Einstein, Eigen), in theoretical biology (e.g., Waddington, Rosen, Kaufmann, Elsasser) and in semiotics (e.g., Deely, Danesi, Merrell, Petrilli) without which the contemporary interdiscipline of biosemiotics would be unthinkable. Instead, selection for inclusion in the volume was limited to those interdisciplinary thinkers who self-identify as "biosemioticians," as well as those "biosemiotic precursors" who have been retrospectively adopted by the community as such (i.e., Peirce, Uexküll and Bateson).

Even within these restricted selection parameters, however, limitations of space have precluded the inclusion of a number of important works by such "second-generation" younger biosemioticians such as Argyris Arnellos, Luis Bruni, Yagmur Denhizen and Yair Neuman, as well as by the more "humanities-based" biosemioticians as Paul Cobley, Marcel Danesi, John Deely, Frederik Stjernfelt and Wendy Wheeler (to name just a very small sample). Thus, mere non-inclusion in this introductory volume does not imply non-centrality to the contemporary project of biosemiotics. Indeed, in many cases, the level of biosemiotic discourse in these works was found to be too advanced for inclusion in this volume, whose aim is to provide an introductory overview only. Having once finished the volume, readers are strongly encouraged to deepen and to continue their study of biosemiotics by consulting the texts cited at the end of the individual articles, as well as those listed in the *Bibliography and Further Reading* lists appearing at the end of the volume.

Finally, two last points about the current volume should be made: one about the organization of the book, and one about the intentions behind it.

Essential Readings in Biosemiotics has been organized as both a teaching tool and as an adventure in thinking. As both a professional teacher and as a lifelong autodidact myself, I have endeavored to design the book such that it can be read from start to finish in the order that the chapters appear for those who will use it for self-teaching and enrichment. Alternatively, its chapters can be assigned piecemeal and selectively for classroom teaching, provided that the instructor already has a sure grasp of the interdiscipline as a whole. For either application, however, it is strongly recommended that both student and non-student readers alike begin their study of this volume by reading the *Introduction* chapter in full, before proceeding to the selection of reprinted texts. Doing so will provide the necessary grounding in both the history of biosemiotics as well as in its theory, allowing for a richer understanding of the subsequent texts.

Of the content of those texts themselves, I will say very little here, having provided in the following volume what I hope to be "comprehensive enough" introductory material to each of them so as to orient the reader to each author's particular life's work and its goals. But I must stress to the reader at the outset – as well as throughout, and also at the conclusion! – that the biosemiotic project is nothing yet resembling a mature, by which is meant a coherent, "science" – and that this

volume is not thus a compendium of formulae for "the correct way" of undertaking biosemiotic inquiry. For Biosemiotics is as yet only a proto-science – as will become obvious once one considers the very many different, and sometimes even contradictory, approaches to the study of sign relations in biology that are proposed by the various authors herein.

"I should not like to spare [my reader] the trouble of thinking," wrote Ludwig Wittgenstein, famously, in the preface to his *Philosophical Investigations*, "but to stimulate [the reader] to thinking new thoughts of his own" (1953 [2001]: x^{e}). Similarly, to borrow an observation about the sign logic of Charles S. Peirce from scholar Thomas Lloyd Short, the biosemiotic proposals that you will find in this book are intended, like all such proposals in natural science, as *hypotheses* – "ideas *not* intended as 'final' but [as working hypotheses] to be applied and developed, perhaps by others. [In other words,] the arguments for these ideas appear not just wholly on the page, but consist instead in *what can be done with them* – just as pragmatism implies" (2007: xii).

"Nothing is yet settled in biosemiotics, everything is on the move," writes biosemiotician Marcello Barbieri, reflecting the consensus of the most recent international biosemiotics conference, "for the scientific exploration of the newly-discovered continent of meaning has just begun" (2007: 112). So, too, is the reader of this volume encouraged to look upon its contents not as a series of dogmatic pronouncements to be accepted or rejected, but as suggestions made in good faith and in full awareness of the enormity of the undertaking, regarding how one *might* profitably go about starting to develop a scientifically accountable framework for the explanation and investigation of the ubiquitous presence of sign relations in the organization and interaction of biological systems.

Read in this way, one can understand biosemiotics for what it really is, and can benefit from this volume in the way that it is intended. For the answers to the questions that biosemiotics asks are not contained within this volume – only some suggestions for building the frameworks that might answer those questions are contained herein. Accordingly, the most important selection lacking inclusion in this book is the one that the reader should afterwards feel compelled to write.

"I can see where this group of disparate thinkers have identified and clarified what the problems are in trying to address the issues of 'meaning' in biology – and they have even convinced me of the ultimate necessity of this task" writes an anonymous reviewer of the current book, "But from what I have read here, it seems like none of them have yet been able to advance a rigorous and detailed enough methodology, framework or platform so as to enable real collaborative scientific effort to begin. Thus, as brilliant as certain ideas or even thinkers may be in isolation – when taken together, 'biosemiotics' as a concrete undertaking seems to have not yet found its footing, and at times gives the impression that it is still flailing around for a foothold."

Having spent the last ten years of my life with this group, and as part of this project, I am actually tempted to agree somewhat with this assessment. But not without this caveat: If one truly recognizes the need for something like a bio-semiotics,

then one owes it to science to put one's own best thought and effort to the task. And therefore I ask the reader once again not to approach this volume passively, but to actively develop what one finds worthwhile in a given analysis in one's own scientific work and understanding and to improve upon the inevitable shortcomings that one will by necessity find in here as well.

History has shown that at the beginnings of a trans-disciplinary investigation for which there is as yet no secure, pre-given scientific framework or vocabulary, an initial bout "flailing for footholds" may be unavoidable. But if that same history is a reliable indicator of what is to come, then eventually one of those very flailings will land on solid ground one day – and at that point, the flailing will have become irrelevant: instead, the willingness to have begun the project at all will be shown to have been all along what counted.

Twenty-four attempts at starting this project are included in this volume.

May your reading of it result in a twenty-fifth.

Donald Favareau